SCIENCE

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FRIDAY, JANUARY 17, 1896.

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MSS. intended for publication and books etc., intended for review should be sent to the responsible editor, Prof. J. McKeen Cattell, Garrison-on-Hudson, N. Y.

THE ASSOCIATION OF AMERICAN ANATOMISTS.

REPORT OF THE EIGHTH ANNUAL MEETING.

THE Eighth Annual Meeting of the Association of American Anatomists was held in the College Hall of the University of Pennsylvania, Philadelphia, Pa., December 27 and 28, 1895. The President, Dr. Thomas Dwight, presided. The following members were present during the meeting: Doctors Harrison Allen, Frank Baker, A. D. Bevan, H. L. Birkett, F. J. Brockway, W. A. Brooks, C. E. Cotton, Thos. Dwight, P. A. Fish, W. S. Forbes, F. H. Gerrish, M. J. Greenman, C. A. Hamann, Addinell Hewson, E. R. Hodge, E. W. Holmes, G. S. Huntington, D. S. Lamb, John Lindsay, J. Ewing Mears, C. S. Minot, R. O. Moody, J. P. Tunis and B. G. Wilder.

Prof. E. D. Cope, Horace Jayne, Theodore Gill, F. A. Lucas, Washington Matthews, H. F. Osborn and W. B. Scott, of the Association, were mainly occupied with the meetings of the affiliated societies.

The following new members were elected: W. G. Christian, M. D., Professor of Anatomy, University of Virginia. Clyde E. Cotton, M. D., Assistant Demonstrator of Anatomy, University of Pennsylvania. Gilman D. Frost, M. D., Professor Anatomy Medical Department, Dartmouth College. Robert H. M. Dawbarn, M. D., Professor Surgical Anatomy and Operative Surgery, New York Polyclinic. Wm. E. Lewis, M.

D., Professor Descriptive and Surgical Anatomy, Cincinnati College of Medicine and Surgery. John Lindsay, M. D., Assistant Demonstrator of Anatomy, University of Pennsylvania. Alfred L. T. Schaper, Demonstrator of Histology and Embryology, Harvard Medical School. Geo. D. Stewart, M. D., Lecturer on Anatomy, Bellevue Hospital Medical College. B. B. Stroud, D. Sc., Instructor in Physiology, Vertebrate Zoölogy and Neurology, Cornell University. Joseph P. Tunis, A. B., M. D., Assistant Demonstrator of Anatomy, University Pennsylvania. George Woolsey, M. D., Professor Anatomy, University of City of New York.

The following were elected to Honorary Membership: Prof. Wm. Henry Flower, London, England; Sir Geo. Murray Humphry, Cambridge, England.

The following members resigned: Tracy E. Clark, B. S., Professor of Natural History, Clinton Liberal Institute, Ft. Plain, N. Y., and Maurice Howe Richardson, M. D., Assistant Professor Anatomy, Harvard Medical School.

Dr. Frank Baker, of Washington, was elected President for the next term; Dr. Addinell Hewson, of Philadelphia, Delegate to the Executive Committee of the Congress of American Physicians and Surgeons; and Dr. A. D. Bevan, of Chicago, a member of the Executive Committee. Dr. Geo. S. Huntington, of New York City, was added to the Committee on the Table at Naples.

The Committee on Anatomical Nomenclature made the following report:

The Committee report general progress in the consideration of the complex subject entrusted to them and express the opinion that substantial improvement will result from the work of the Committee of the *Anatomischer Gesellschaft*.

Your committee recommend to anatomists that, other things being equal, terms consisting of a single word each be employed rather than terms of two or more words. Harrison Allen, Chairman; Thomas Dwight, Frank Baker, Frederick H. Gerrish, Burt G. Wilder, Secretary.

The committee on the collection and preservation of anatomical material, consisting of J. Ewing Mears, J. D. Bryant and Thomas Dwight, made the report which is appended (see page 77).

The Secretary was instructed to have a copy of the amended report and a copy of the Presidential address sent to the Professors and Demonstrators of Anatomy in the United States and Canada.

The Secretary reported that there were 115 active members and five honorary.

The following papers were read:

1. 'Myology of the extremities of Lemur Bruneus.' Illustrated by drawings and casts of muscles. Dr. George S. Huntington, New York City.

2. 'History of the Ciliary Muscle.' Dr. Frank Baker, Washington, D. C.

3. 'Absence of Fibrous Pericardium of left side.' Illustrated by specimen. Dr. Addinell Hewson, Philadelphia, Pa.

4. 'The Descriptive Anatomy of the Human Heart.' Dr. Wm. Keiller, Galveston, Texas.

5. 'Nomenclature of Nerve Cells.' Dr. Frank Baker, Washington, D. C.

6. 'The Cerebral Fissures of Two Philosophers.' Illustrated by specimens and photographs. Dr. B. G. Wilder, Ithaca, N. Y.

7. 'The Human Paroccipital Fissure; Should it be Recognized and so Designated?' Illustrated by specimens and photographs. Dr. Wilder.

8. 'Practical Histology for Large Classes.' Dr. Chas. S. Minot, Boston, Mass.

9. 'Some Novel Methods of Description of the Human Skull.' Dr. Harrison Allen, Philadelphia, Pa.

10. '*Fossa Capitis Femoris*, with Observations on the Trechanteric Fossa.' Illus-

trated by specimens. Dr. F. J. Brockway, New York City.

11. 'Note on the Appearance of a Unilateral Tuberosity in Place of the Trochanteric Fossa.' Illustrated by specimen. Dr. D. S. Lamb, Washington, D. C.

12. 'A Case of Polyorchis.' Illustrated by specimen. Dr. D. S. Lamb.

13. 'The Cerebrum of Phoca Vitulina.' Illustrated by specimen. Dr. P. A. Fish, Washington, D. C.

The members of the Association were entertained by Dr. Horace Jayne, of Philadelphia, who gave a reception on the night of the 26th; were lunched on the 27th and 28th by the University authorities, and on the 28th by Mr. W. B. Saunders at the Art Club.

The courtesies of the American Philosophical Society were also extended. On the evening of the 26th they also listened to a lecture by Prof. W. B. Scott, of Princeton, N. J., on the 'History of the Lacustrine Formations of North America and their Mammalian Fossils.'

A banquet by members of the affiliated societies was given on the evening of the 27th at the Hotel Lafayette and was well attended.

D. S. LAMB,
Secretary.

OUR CONTRIBUTION TO CIVILIZATION AND TO SCIENCE—PRESIDENTIAL ADDRESS BY DR. THOMAS DWIGHT, HARVARD MEDICAL SCHOOL.

It had not been my intention to inflict upon the Association a Presidential address; but at a late moment, impressed with the gravity of the matters that are to come before us, far transcending as one of them does, the importance of purely scientific discussion, I felt it a duty I owe to the position I have the honor to hold, to introduce them to the Association with the best suggestions concerning them I can offer. It is not too much to call them our contribution to civilization and to science. Easily first in importance is the report of the committee on procuring and using anatomical material. Though both branches of the question are of interest to anatomists, the first rises beyond the sphere of the specialist. It is a social question of the first importance. I shall not anticipate the report of the committee, of which I am a member. I wish merely to lay down briefly certain principles which, I conceive, should guide us. We know only too well that dissection is an abomination to the popular mind. The aversion to it is well nigh universal, confined to no class of society, nor to any creed. This horror seems to be founded chiefly on two points, one the deprivation of sepulchre, the other the idea that the remains are submitted to wanton insult. The idea that respect is due to the dead body is so deeply rooted in the human mind as to be almost instinctive. I am far from calling these feelings superstitious. We know, indeed, that no violence can harm the dead, but, though reason is convinced, the heart is not satisfied. We anatomists, no less than others, shudder at the thought of the desecration of the remains of those who have been near and dear to us. The mad wrath caused by the feeling that graves are not safe is a well justified one. It is a disgrace to our civilization that in some parts of the Union body-snatching is still practised, and that in others there exists an illicit trade in human bodies. Should any of my colleagues think me indiscreet in alluding to these matters, I must remind them that I am saying nothing which has not been made notorious through the public press.

It is idle to hope, while human nature remains what it is, that aversion to dissection will ever disappear. Our wisest course is to recognize it, and to soften it by removing all just cause of complaint. It should be made clear to the public that dissection can and should be followod by

decent burial. I, myself, would go so far as to have the bodies of Protestants and Catholics buried in their respective cemeteries, when the creed of the deceased is known. It also should be understood that no wanton insult is permitted in reputable schools.

From careful observation I am convinced that the policy which will lead to the most satisfactory results is one of complete openness, that above all, we should avoid a timidity which shirks discussion of this topic. When we shall show so clearly as to carry conviction, that we have nothing to conceal, a great step will have been taken. I like to boast that the anatomical department of the Harvard Medical School is ready to give an account of every body it receives. If there be aught in the management of dissecting rooms that calls for criticism, I would not have reform forced upon us from without. Let us be the first to anticipate every reasonable demand.

It seems to me that this is making every possible concession to the sentimental side of the question; but another complaint is often made in all honesty, by well-meaning persons, who object that the bodies of the poor should be treated otherwise than those of the rich. I reply that no one would reprobate more strongly than I any law that would allow the taking of the bodies of the poor from their near relatives; but we must distinguish between the respect due to the feelings of the living and any admission that dissection is in itself an injury to the dead. The former is humanity; the latter is superstition, and to my mind a very contemptible one.

I have alluded to the scandal of body-snatching, but an equally great scandal is its cause; the want, in many places, of an anatomy act, or the existence of one which the framers and all others know to be inadequate. This state of affairs is in more respects than one an injury to the community. Like a prohibitory law meant to be boasted of on the platform and in the pulpit, but not meant to be inforced, it destroys respect for law. It is the bounden duty of authorities of States, without adequate provision for dissection, to see that it is not practiced. After all, such communities deserve to be treated by surgeons ignorant of anatomy.

A radical defect in the laws of many States, otherwise well drawn, is that the delivery to medical schools of unclaimed bodies is optional with superintendents, Boards of Trustees and municipal authorities. The result of this is that those in authority very naturally hesitate to do anything for the advancement of science, which not only can be of no possible advantage to themselves, but may involve them in serious difficulties. The cry of outrage on the poor is a sure card in the hand of the political demagogue, especially when it is raised against some honored institution. It may also be used as a means of annoyance against political opponents. It is far easier, therefore, for those in office to remain quiet and leave science to suffer. A mandatory law would free them from all responsibility. 'Thyself shalt see the act,' would be a sufficient answer to all complaints.

Details of law may and must differ with the locality, but a good anatomy act should have the following characteristics: First, it should be just, safeguarding the rights of the poor, and securing decency; next, that it should be mandatory; finally, it should be easy of execution. It is our duty in our several States to do our utmost for the passage of a law that shall advance science, protect the grave and do credit to the community. We have not the excuse of older times that the question is a new one. In view of our own shortcomings it behooves us to judge them lightly. For my part, I have far more respect for those who opposed

dissection on the ground, however mistaken, that it might be displeasing to God, than for those who make it illegal by pandering to the prejudices of the ignorant. Dr. Johnson's advice, 'free your mind from cant,' is here singularly *à propos*. We cannot boast of our civilization till this is remedied.

Another subject which comes before us for discussion is the important question of anatomical nomenclature. German anatomists have recently adopted a report prepared by some of their number, working in company with representatives of other European countries. It is for us to consider whether this one can be looked upon as accepted and whether it is acceptable; whether we can join hands with our foreign colleagues, or whether we can devise an American nomenclature which shall be so much better that we can disregard the inconvenience of a distinct standard. We have had for years a committee on anatomical nomenclature, with Professor Wilder for secretary, who has given so large a part of his busy life to this matter. We may expect an important contribution to the matter in the report of this committee..

We are to hear also from the committee appointed to consider the anatomical peculiarities of the negro. I am not informed what success has been reached in the difficult task of collecting statistics. It is a work of such anthropological importance that it would be doubly to be regretted should it come to naught. As has already been said at our meetings, it is most proper that this Society should collect all possible information as to the anatomy not only of the negro, but of such savage races as still survive in North America, and of the extinct ones, whose bones can still be procured in large numbers.

Thus, gentlemen, you see that this meeting, besides the attractive list of papers, has before it matters of no ordinary interest and importance. I will no longer detain you from your work, firmly persuaded that the action of this Association will be in the interest of civilization and science.

REPORT OF THE COMMITTEE ON THE COLLECTION AND PRESERVATION OF ANATOMICAL MATERIAL.

To the Association of American Anatomists:

The committee appointed at the meeting of the Association to obtain information with regard to the collection and preservation of anatomical material, and report what in their opinion are the best means of accomplishing these objects, begs respectfully to submit the following report:

In order to make the work of the committee as comprehensive as possible and to obtain information which would be of service in arriving at definite conclusions as to the best methods of accomplishing the purposes in the resolution, the committee deemed it desirable to send to the teachers of anatomy, not only in this country, but abroad, a circular letter, with the following questions appended, and respectfully requested answers to be made thereto as fully as possible:

1. Is anatomical material obtained in accordance with legal enactment, wholly or in part?

2. Is there an Anatomical Law in your State or country? If so, please send a copy to the chairman of the committee. Please state whether the law is satisfactory in its provisions, whether it is readily obeyed by those upon whom duties are imposed by it, and mention any improvements you would suggest as to its requirements.

3. Is the material received in good condition?

4. What disposal is ultimately made of the remains?

5. Please state what means are employed to preserve anatomical material for the purposes of dissection or operative surgery. If injections of preservative fluids are used,

state their composition and the methods of use, at what point injections are made, whether at the heart or in the large arteries, and their effect in accomplishing the preservation, with any changes in the color or character of the tissues. What length of time can material be used in dissection employed by you? If preservation by means of cold storage is employed please state the cost of the machinery which it was necessary to construct for this purpose, and what means are taken to prevent decomposition after the subject is placed upon the table for dissection.

6. Please state the cost by the method employed by you, for the reception, the injection and preservation of each subject.

7. Do you obtain an adequate supply of material for the purposes of anatomical instruction? How many students are assigned to each subject, and what is the method of allotment?

8. Please give any further information which you may deem of importance.

This letter was sent to the professors of anatomy in 148 colleges in the United states; 25 in foreign countries, and 25 copies were sent to the medical journals in this country and abroad. Forty-two replies have been received by the committee containing more or less specific answer to the questions propounded in the circular. An analysis of the replies received presents the following results:

1. Anatomical material is received wholly under the provisions of the law in thirty States and countries, in part by law, in seven; and without law, in five.

2. In reply to the second question proposed, fifteen copies of the laws which are in force, have been sent to the chairman of the committee, thirteen of them being the laws of States of this country, and two of foreign countries. With regard to the execution of the law, information was given to the effect that the provisions of the law were satisfactorily complied with in ten, fairly so in ten, not satisfactory in twelve, and no replies were given in ten. In eight the provisions of the law were stated to be obligatory, and in six the provisions were optional. In considering the subject of the report so far as it relates to the collection of anatomical material by law, the committee has confined itself to the examination of and report on the anatomical laws of the States of this country.

3. The report as to condition in which anatomical material was received was that in twenty instances it was good; in twenty-one, fair; and in one, bad.

4. As to the disposition of the remains, in twenty-seven institutions they were reported buried; in ten, cremated; and in four, thrown away.

5. The answers received to the question with regard to the agents employed in accomplishing the preservation of subjects, gave information as to quite a large number employed and in various combinations. An analysis shows that of the agents used carbolic acid stands first, and that it was used not alone but in combination with other agents. Glycerine was reported as an ingredient in the next highest number. It was also employed in combination with other agents. The next in frequency was reported to be arsenic, and this agent was used also in combination. Chloral hydrate and chloride of zinc and bichloride of mercury come next in the order of use. Alcohol, either pure or in combination, carbonate of potassium, bicarbonate of sodium, chloride of sodium, methyl spirit, formalin, nitrate of potassium, brown sugar, boric acid, were reported as used in numbers varying from four to one. The preservation of subjects by cold storage was reported in five instances. Some of the agents above noted were used in combination to preserve the subject, which had been kept in cold storage after it was placed upon the table for dis-

section. In one instance the following plan was reported: Injection with carbolic acid one and a half pints, glycerine six pints, with alcohol one and one-half pints. After the injection, directions were given to paint the subject daily for fourteen days with carbolic acid, one part to glycerine six parts, and then place it in an air tight box over a pan of methylated spirits. Perfectly satisfactory results were reported to have been obtained by this method, both as regards the character of the tissues and the absence of odor. Subject keeps indefinitely. Chloride of zinc, a fifty per cent. solution of neutral reaction was reported as an agent used successfully in preserving subjects, but had the objection of unfavorable action on the tissues, causing hardness and change in color. If subject is not required for immediate use it was placed in a saturated solution of salt, forming a strong brine. If immersed for a long time in the brine the subject requires to be soaked in water for a period of twenty-four or forty-eight hours, in order to soften the tissues.

A number of formulæ were given, among them Wickersheim's Formula, consisting of three thousand parts of boiling water, one hundred and nine parts of alum, twenty-five parts of chloride of sodium, twelve parts of nitrate of potassium, sixty parts of carbonate of potassium, ten parts of arsenious acid, when cool filter, and to ten parts of the liquid thus obtained add one part of methylic alcohol and four parts of glycerine.

Van Vetter's Formula: Seven parts of glycerine, one part of brown sugar and one-half part of nitrate of potassium.

Langer's Formula: One hundred parts of glycerine, fifteen parts carbolic acid, eleven parts of alcohol.

Empersonne's Formula: Chloral Hydrate five hundred grains, glycerine two and a-half litres and distilled water.

Among the formulæ reported, arsenic was an ingredient in a large number, and in the following combinations: 1. Arsenic (pure) eleven and one-half pounds, carbonate of potassium twenty-one pounds, crude carbolic acid and glycerine each two pints, with distilled water sufficient to make one gallon. 2. One pound of arsenic, one pound of bicarbonate of soda, one pint of salt, six quarts of water. 3. Injection of arseniate of potash, mixed in large quantity with liquid soap. 4. Arseniate of soda, in saturated solution, one gallon; carbolic acid, eight ounces; glycerine, one-half pint. The above formulæ afford examples of the use of arsenic, either in the form of arsenious acid, arseniate of potassium, or arseniate of sodium. As a rule, it was combined with some salt of potash, carbolic acid and glycerine. In a few instances it was reported as being used alone in solution.

Carbolic acid appears in a large number of the formulæ reported in use. In most instances in combination with arsenic, some salt of potash or soda or bichloride of mercury. In few instances it is reported as being used alone.

Bichloride of mercury is also reported as largely used alone or in combination with arsenic, salts of potash or soda, carbolic acid and glycerine; one formula being one five-hundredth solution of bichloride of mercury in mixture of water, glycerine and alcohol; another, a mixture of bichloride of mercury, glycerine, carbolic acid and spirit. The bicarbonate of potash, bicarbonate of soda, nitrate of potash, as well as the chloride of sodium, appeared in a number of the combinations employed. They are not reported as possessing sufficient preservative power which would permit them to be used alone.

Glycerine appears to be a favorite agent, as it forms a part of a large number of formulæ. The same may be said in a very less degree however, with regard to the use of alcohol.

Formalin is reported in two instances,

in one of which it was used in connection with the preservation of human subjects, and another in the preservation of an animal. In the latter instance the agent was used in the proportion of one part to two hundred parts of water. The animal was injected with the solution thus prepared and the body was placed in a tank with a large quantity of fluid which was changed after a period of one week, then after a period of three weeks and strengthened from time to time by the addition of a little formalin. Experience obtained in this case was that, to make the injection of this agent effective, the body should be thoroughly injected, washing out the blood if possible, and if the body is not to be dissected at once it should be placed in a receptacle capable of being sealed up to prevent the escape of formalin, and to prevent the formation of mould it should at all times be covered by the solution. The cost of the formalin was stated to be $1.65 per pound package for a forty per cent. solution.

5. As to the point in which injections were made there were reported two in the heart, nineteen in the common carotid artery, and six in the common femoral artery. As to the condition of the tissues after injection but few replies were received and these were not satisfactory. With regard to the time in which material can be kept and used in dissection, the replies include periods from three weeks to one year. Five reported having used or were using the method of preservation by cold storage. The cost of the plant being from $500 to $3,000.

6. The cost of receiving and preserving material is stated to be from $1 to $25 per subject.

7. In fifteen cases the supply of material is stated to be sufficient and in fifteen not sufficient. In a number it was stated to be adequate, but more could be used if obtainable. The number of students were reported as assigned to each subject to vary from four to sixteen.

While the committee feels that the information gathered through the circular letter was not in some respects sufficiently specific to enable it to arrive at definite conclusions, upon the subject under consideration, yet it believes that certain statements may be made and conclusions deduced which will be of value to teachers of anatomy and those interested in the collection and preservation of anatomical material.

The committee regards it in every way as a matter to be most favorably commented on that out of the 42 replies from institutions 30 contained information that anatomical material was obtained for the purposes of instruction under the provisions of the law. An examination of the copies of the law which were sent to the chairman of the committee shows them to be defective in many respects, giving evidence in the provisions incorporated in the laws of a strong feeling on the part of legislators against the enactment of laws controlling the disposition of dead human bodies for the purpose of dissection. This feeling has no doubt its origin in a fear that by so doing they will expose themselves to criticism, if not to censure, by their constituents. This sentiment it believes can be largely changed by the influence exerted upon the public mind by the members of the medical profession. In every community it should be the effort of the medical profession to educate public opinion upon this point. To place before the public the great necessity which exists for the use of dead human bodies in providing the proper instruction of students in medicine, and the great protection afforded the citizens in each State by the enactment of laws which will regulate the supply of anatomical material and thus afford protection to the dead and prevent the desecration of their resting places.

With regard to the protection which a properly framed law affords to the community, it may be stated that it is within the information of the committee and also it may be said of the public that the body of a member of the family of one of the highest officers of the land was found in the dissecting room of a medical college. In the State in which this family resided there was at that time no Anatomical Law in existence. Since then one has been enacted, and the repetition of such an occurrence as that referred to is not possible under its provisions.

Since the preparation of this report was begun it has been reported in the daily papers that a physician residing in one of the Western States has been convicted for the desecration of a grave, by the removal of the body which it contained, and which was to be used for dissection, and has been sentenced to imprisonment for a term of three years. In the State in which this occurred, there is, so far as the committee knows, no Law governing the use of dead human bodies for the promotion of medical science. These instances afford, the committee thinks, in a very forcible manner, evidence of the protection which would be furnished to both the community and the profession by the provisions of a properly framed Anatomical Law. Attention has been called to the fact that in a number of existing laws their provisions on examination were found to be defective. In some instances they were so inadequate as to render the execution of the law practically impossible, and in other cases to make the law inoperative. On this point the committee feels it proper to express an opinion to the effect that the requirements of any law which is to be enacted should be made compulsory, and not optional, as to performance of duty on the part of public officers. It thinks that sufficient experience has been obtained in the effort to secure compliance with the terms of Anatomical Laws to make it evident that under such conditions only can the proper supply of Anatomical material be obtained. In any law enacted it also believes that proper protection should be afforded the public as well as the profession in strict specification as to the right of claim for burial. This right should be limited to relatives either by blood or marriage.

In this way claims made by organizations and individuals moved by feelings of sentiment would be disposed of. In almost all States, if not indeed in all, legal provisions are in force which control the burial of the bodies of certain individuals, notably war veterans.

With regard to any other claims by organizations or individuals, it would be proper to leave them to the discretion of those having charge of the execution of the requirements of the law. A spirit of conciliation and a regard for public sentiment should always actuate those concerned in the execution of the law, in order, so far as possible, that any feelings of antagonism or hostility should be removed. As stated above, it should be the duty of members of the medical profession to educate public sentiment and obtain in every State enactment of a law which will control the use of dead human bodies for the promotion of medical science. At this time of writing the daily papers contain an account of the action by the Governor of a Western State, who has been compelled to call upon the military force to protect a medical college, which has been threatened by a mob. In this case the trouble has been caused by the discovering in the dissecting room of the college of bodies removed from a cemetery adjacent to the city in which the college is situated. Here is plainly made manifest the necessity of a law to protect both the public and the profession. An examination of the laws now in force in the States in this

country leads the committee to the belief that the law of the State of Pennsylvania is the best, in the fact that it includes in its terms all the provisions necessary to compel compliance on the part of public officers and to protect the citizens of the Commonwealth in all of their rights. It is also observed in the examination of the laws of other States that many of them have been founded upon this law, but in no instance have all of the provisions of the law been incorporated. This is possibly to be expected, as the conditions existing in each State control the actions of the legislative bodies in the framing of laws. A copy of the law of the State of Pennsylvania is appended to this report, and may be examined by the members of the Association.

With regard to the disposition of the remains left after dissection, the committee feels it proper to advise that so far as possible they should be decently interred. Under any circumstance the committee thinks that it is not in keeping with the proper sentiment to dispose of them in the manner in which it is feared it is sometimes done. The retention of bones in some instances for the purposes of study and instruction and for the preparation of articulated skeletons is necessary and sanctioned.

With regard to the preservation of anatomical material by the injection of chemical agents or by cold-storage method, the committee feels that the information received is not as specific and comprehensive as desired. The agents reported to be in use, either alone or in combination, are such as are well known to the teachers of anatomy. There is apparently no conclusive evidence that any one of the agents alone, or in combination, accomplishes all that is desired in the way of the perfect preservation of anatomical material. Perfect preservation includes not only freedom from decomposition, but the maintenance of the tissues in a normal condition as nearly as possible, and the existence of these conditions for such length of time as may be necessary in the storage of subjects on one hand and the time required for the work of actual dissection on the other hand. In many institutions it is necessary to collect during a period of the year, and that the most unfavorable season, so far as temperature is concerned, a number of subjects which shall be kept in a state of preservation for a number of months, so that they may be, in every respect, suitable for dissection. To accomplish this it is necessary to employ an agent which will not only prevent decomposition, but also to provide some means to so keep the subject that it may be maintained in this condition of preservation without material change in the color or character of the tissues. These ends are to be obtained, it is also to be observed, within what may be regarded as a reasonable cost. To accomplish the latter object it is manifest that one agent should be used rather than a combination of agents. For instance, the use of arsenious acid or bicloride of mercury, both of which are inexpensive, will provide a means of preservation at no very great cost. When these agents, however, are used in combination with glycerine, rectified spirits, or methylic alcohol, the cost will be materially increased and the storage of the subjects, thus injected, in alcohol or other agent of similar character, will add to the expense. The committee is not able to say from the information received that any of these agents will preserve anatomical material for a number of months. Undoubtedly solutions of bicloride of mercury, arsenic or carbolic acid, will prevent the occurrence of decomposition for a limited period of time, sufficient under ordinary circumstances for the complete dissection of the subject, but no evidence was adduced that these agents, when injected into a subject which was to be stored in a saline solution for a number

of months, would be effective. The use of salts of potassa is advised in a number of instances, and, as is well known, they are of value in combinations, the effect being not only in a slight degree preservative, but is also manifest on the color of the tissues. The use of arsenic solutions is objected to by students on account of the irritation of the fingers which is produced. While there may be a few instances in which this objection becomes a matter of serious importance, it may be regarded as of minor importance in a great majority of cases. The objection against the use of glycerine is the production of mould, which occurs as the result of the hygroscopic action. The expense attending the use of alcohol is such as to forbid its employment in any large quantity for injection or storage purposes. Formalin is reported as effective as a preservative and storage agent, but its cost is a strong objection against its use. The committee believes that the method of preservation by means of cold storage is the best which could be employed, but the question of expense of the introduction of a plant necessary for this purpose is a very serious one. In cities where more than one medical institution is situated, it seems feasible to have a central plant in which subjects required in all the institutions can be stored, with the division of expense made amongst those entering into the arrangement. As to the time in which subjects should be injected which are kept in cold storage plants, it is desirable that this should be done prior to their deposit. They will be ready to place at once upon the table, and it is believed the injections can be better made before deposit rather than after they have remained some time under the influence of the cold.

Reference is made to the use of the solution of chloride of zinc as a preservative agent of value, especially where it is necessary to collect subjects during the summer months, and to keep them in a solution of a salt. Solutions of chloride of zinc will, without doubt, not only prevent but arrest decomposition. The bleaching properties which it possesses and which it exerts upon the tissues is a very serious objection. This agent is used largely, if not, altogether in the medical institutions of Philadelphia, to which are supplied each year over seven hundred subjects. It is used as an injection in the proportion of one-half to one-third of a fifty-per cent. of solution of neutral reaction, a subject of average weight requiring from four to six quarts.

In the replies given as to the cost of the reception, preservation and injection of subjects a wide difference is observed. It is evidently impossible, unless subjects are transported without cost, to reduce the cost per subject for reception, injection and preservation to $1.00 each. Under the provisions of a well framed law, it is believed that the delivery of subjects should not exceed as an average from $5.00 to $8.00, and the injection and preservation should be accomplished by an additional expenditure of $5.00, making the cost of each when placed npon the table about $12.00.

Less than one-half of the replies received as to the supply of anatomical material contained the statement that the supply was adequate. In an equal number the supply was stated to be not sufficient and the remaining number reported that more subjects could be used if obtainable. The conclusion to be deduced from these statements is manifestly to the effect that the supply of anatomical material in our medical institutions is not as great as it should be.

The number of students assigned to each subject were stated in the replies received to vary from four to sixteen. Here again, it is to be observed, a wide difference is expressed. The number on one hand to be too small to obtain the proper economy in the use of material, and on the other hand

too large to secure the full instruction necessary. It is to be observed that the manner in which instruction is imparted will modify the statements above made.

CONCLUSIONS.

1. Anatomical material for the promotion of medical science should be obtained wholly under legal enactment. The provisions of the law should be compulsory upon all officers of State and county institutions and municipal governments.

2. Of the anatomical laws which are in force in this country, the committee is of the opinion that the law of the State of Pennsylvania is the best. It is framed in such manner as to provide under a strict execution of its requirements anatomical material for the promotion of Medical Science and prevents the desecration of the resting place of the dead.

3. The committee believes it would contribute to the best interests of anatomical teaching in this country if action was taken by this association to secure the enactment in every State of a law controlling the collection and distribution of anatomical material and recommends such action.

4. The committee finds itself unable, from the information which has been received, to arrive at any definite conclusions with regard to the best means for accomplishing the preservation of anatomical material for the purposes of dissection. Many of the agents reported in the communications received have been long in use, and to a greater or less degree have been employed successfully in securing preservation of anatomical material, but not with all the conditions which are deemed as essential in perfect preservation, and those which afford the best results in dissection. Preservation by means of cold storage it believes to be a method which approaches nearest to perfection, and it should be arranged upon such a plan as will admit of the retention of anatomical material, under the influence the low temperature during dissection.

(*Signed.*) J. Ewing Mears,
J. D. Bryant,
Thomas Dwight.

November 19, 1895.

The following amendment to the report was adopted: "That Professors of Anatomy be requested to inform their students concerning the laws upon the subject of anatomical material, and request these students to use their influence with the authorities in their respective places of residence to increase the quantity of anatomical material by making available much that is now withheld, either from neglect or indifference."

ANATOMICAL LAW OF THE STATE OF PENNSYLVANIA, ENACTED JUNE 13, 1883.

For the promotion of medical science by the distribution of and use of unclaimed human bodies for scientific purposes through a board created for that purpose, and to prevent unauthorized uses and traffic in human bodies.

Section 1. *Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania, in General Assembly met, and it is hereby enacted by the authority of the same:* That the professors of anatomy, the professors of surgery, the demonstrators of anatomy, and the demonstrators of surgery of the medical and dental schools and colleges of this Commonwealth, which are now or may hereafter become incorporated, together with one representative from each of the unincorporated schools of anatomy or practical surgery within this Commonwealth in which there are, or from time to time at the time of the appointment of such representative shall be, not less than twenty-five scholars, shall be, and hereby are constituted a board, for the distribution and delivery of dead human bodies hereinafter described, to and among such persons as under the provisions of this Act are entitled

thereto. The professor of anatomy in the University of Pennsylvania at Philadelphia shall call a meeting of said board for organization at a time and place to be fixed by him within thirty days after the passage of this Act. The said board shall have full power to establish rules and regulations for its government, and to appoint and remove proper officers, and shall keep full and complete minutes of its transactions, and records shall also be kept under its direction of all bodies received and distributed by said board, and of the persons to whom the same may be distributed, which minutes and records shall be open at all times to the inspection of each member of said board, and of any district attorney of any county within this Commonwealth.

SEC. 2. All public officers, agents, and servants, and all officers, agents, and servants of any and every county, city, township, borough, district, and other municipality, and of any and every almshouse, prison, morgue, hospital, or any other public institution having charge or control over dead human bodies required to be buried at the public expense, are hereby required to notify the said board of distribution, or such person or persons as may from time to time be designated by said board, or its duly authorized officer or agent, whenever any such body or bodies come into his or their possession, charge, or control, and shall, without fee or reward, deliver such body or bodies, and permit and suffer the said board and its agents, and the physicians and surgeons from time to time designated by them, who may comply with the provisions of this Act, to take and remove all such bodies to be used within this State for the advancement of medical science; but no such notice need be given, nor shall any such body be delivered if any person, claiming to be and satisfying the authorities in charge of said body that he or she is of kindred or is related by marriage to the deceased, shall claim the said body for burial, but it shall be surrendered for interment, nor shall the notice be given or body be delivered if such deceased person was a traveller who died suddenly, in which case the said body shall be buried.

SEC. 3. The said board, or their duly authorized agent, may take and receive such bodies so delivered as aforesaid, and shall, upon receiving them, distribute and deliver them to and among the schools, colleges, physicians and surgeons aforesaid in manner following: Those bodies needed for lectures and demonstrations by the said schools and colleges, incorporated and unincorporated, shall first be supplied, the remaining bodies shall then be distributed proportionately and equitably, preference being given to said schools and colleges, the number assigned to each to be based upon the number of students in each dissecting or operative surgery class, which number shall be reported to the board at such times as it may direct. Instead of receiving and delivering said bodies themselves, or through their agents or servants, the board of distribution may from time to time, either directly, or by their authorized officer or agent, designate physicians and surgeons who shall receive them, and the number which each shall receive. Provided always, however, that schools and colleges, incorporated and unincorporated, and physicians or surgeons of the county where the death of the person, or such person described, takes place shall be preferred to all others. And provided, also, that for this purpose such dead body shall be held subject to their order in the county where the death occurs for a period not less than twenty-four hours.

SEC. 4. The said board may employ a carrier or carriers for the conveyance of said bodies, which shall be well enclosed within a suitable encasement, and carefully deposited free from public observation.

Said carrier shall obtain receipts by name, or, if the person be unknown, by a description, for each body delivered by him, and shall deposit said receipt with the secretary of the said board.

Sec. 5. No school, college, physician, or surgeon shall be allowed or permitted to receive any such body or bodies until a bond shall have been given to the Commonwealth by such physician or surgeon, or by or in behalf of such school or college, to be approved by the Prothonotary of the Court of Common Pleas in and for the county in which such physician or surgeon shall reside, or in which such school or college may be situate, and to be filed in the office of said Prothonotary, which bond shall be in the penal sum of one thousand dollars, conditioned that all such bodies which the said physician or surgeon, or the said school or college, shall receive thereafter shall be used only for the promotion of medical science within the State; and whosoever shall sell or buy such body or bodies, or in any way traffic in the same, or shall transmit, or convey, or cause to procure to be transmitted or conveyed said body or bodies to any place outside of this State shall be deemed guilty of a misdemeanor, and shall, on conviction, be liable to a fine not exceeding two hundred dollars, or be imprisoned for a term not exceeding one year.

Sec. 6. Neither the Commonwealth, nor any county or municipality, nor any officer, agent, or servant thereof, shall be at any expense by reason of the delivery or distribution of any such body, but all the expenses thereof, and of said board of distribution, shall be paid by those receiving the bodies, in such manner as may be specified by said board of distribution, or otherwise agreed upon.

Sec. 7. That any person having duties enjoined upon him by the provisions of this Act, who shall neglect, refuse, or omit to perform the same as hereby required, shall, on conviction thereof, be liable to fine of not less than one hundred nor more than five hundred dollars, for each offence.

Sec. 8. That all Acts or parts of Acts inconsistent with this Act be and the same are hereby repealed.

Philadelphia, January 1, 1889.

In accordance with the requirements of the above law the Anatomical Board of the State of Pennsylvania was organized July, 1883, for the purpose of carrying it into execution. The attention of all State, county and municipal officers charged with duties under the law is directed to its requirements. Boxes containing bodies should be addressed to George Willie, Philadelphia, and should be delivered to the agent of the express company at the station nearest to the place from which the body is sent. The charges paid by the Board for transportion to the railroad station vary from $1.00 to $2.50 in accordance with the distance. These charges will be paid by the agent of the express company, and collected from the Board by the agent in Philadelphia.

SEVENTH ANNUAL MEETING OF THE AMERICAN FOLK-LORE SOCIETY.

The American Folk-lore Society held its seventh annual meeting in Philadelphia on Friday and Saturday, December 27 and 28, 1895. Although the attendance was rather slim, the number and the value of the papers presented made the session an interesting one. The President, Dr. Washington Matthews, opened the meeting with an address on the poetry and music of the Navahoes. He brought out very clearly the misconception of superficial observers who have not had the opportunity to enter into the spirit of Indian life, and consequently described the primitive tribes as void of poetic or musical feeling. The examples given by the speaker are ample proof that the Nava-

hoes possess a well-developed poetry. In a supplementary paper by Professor J. C. Fillmore the characteristics of Navahoe music were described, which showed that in this case also harmony is the underlying principle of primitive music.

Dr. Robert Bell, the indefatigable explorer, to whose zeal we owe much of our knowledge of the topography and geology of northern Canada, related five Algonquin myths which he collected in the region between Ottawa River and Hudson Bay. These have their close analoga among other tribes of the same stock. Magic and medicine came in for a considerable share of attention in the papers read on the first day of the proceedings. Mr. Stanbury T. Hagar treated the Micmac of Nova Scotia from this point of view, while Dr. J. H. McCormick described the medicine myths of the Cherokee, and Mr. Heli Chatelain made an interesting contribution on the customs of the natives of West Africa.

On the second day a number of papers were read referring to current superstitions of the whites in America. Mr. Robert M. Lawrence presented a vast amount of information on the folk-lore of the horseshoe, in which he dwelt upon the superstitions, referring to its form and material, and those referring to the place at which the horseshoe is used in order to secure good luck. Mr. W. W. Newell contributed a review of a collection on moon superstitions in America made by Mrs. Fanny Bergen. Dr. D. G. Brinton showed how the tendency to displace sacred words by others has led to a curious development of 'cuss words' in America.

A very comprehensive review of the customs of the Spanish in the Rio Grande Valley was presented in a paper by Captain John Bourke on 'Arabic Survivals in the Rio Grande Valley.' Dr. F. Boas discussed the dissemination of tales in America, basing his argument on a comparative study of the myths of the Indians of the North Pacific Coast. A noteworthy myth of the Navahoes was told by Dr. Matthews, in which the principle underlying the secret societies of this tribe was brought forward most clearly. This seems to be identical among all the tribes of North America: An ancestor of the Indians is taken away by certain supernatural beings and is taught by them the secrets and particularly the songs of the society. In conclusion, Dr. McCormick read a paper on negro folk-lore in America.

The work of the Folk-lore Society has shown a marked advance of late years. Although the membership has not as much increased as might be desired, the Society has been able to publish, in addition to its journal, a number of supplementary volumes dealing with special subjects, and has thus succeeded in making valuable contributions to the study of American folk-lore. This work is being carried on as energetically as possible, and in the coming year the Society expects to publish two new volumes, one on current superstitions among the English speaking people of North America, by Mrs. Fanny Bergen, and a second one, a full collection of Navahoe myths, by Dr. Washington Matthews. The Society derives much of its support from local societies which are being organized in a great number of the larger cities of our continent, but most of its success is due to the unflinching perseverance of its Secretary, Mr. W. W. Newell.

The officers elected for the coming year, are: Captain John Bourke, President; Mr. Stewart Culin, First Vice-President; Dr. F. Boas, Second Vice-President. The next annual meeting will be held in the Christmas week of this year, in Baltimore, Md.

F. B.

ALASKA AS IT WAS AND IS, 1865–1895.

(Concluded.)

AT the time of my first visit and until very recently the sole productive industry

of the Aleut people consisted in the sea-otter hunting and the fur-seal fishery. Much of their subsistence was and is obtained from the natural products of the region—fish, wild fowl, and the flesh of marine mammals. The custom of preparing clothing from the skins of birds and animals has long been abandoned. The Aleut and his family now dress in clothing of wool or cotton, burn kerosene in an American lamp, and cook their food on an iron stove. The barábora or native hut, built of sod and stones, has been generally replaced by a frame cottage, and the means for supplying these artificial wants has been obtained from the income derived from the seal and sea otter. Now that these animals are approaching extinction, at least from a commercial standpoint, the question how to provide even the modest income needed for these people is a serious one. While it is not yet settled that the half-starved Eskimo of the northern coast will adopt the new mode of life necessitated by the care and maintenance of large herds of tame reindeer, and the success of that experiment is still questionable, there is no doubt in my mind that the introduction of the deer into the Aleutian chain is not only perfectly practicable, but that it offers the only solution of the problem of providing for the Aleuts which seems to possess the elements necessary for success. There are no predacious animals to molest the deer, like the wolves of the mainland; there is an abundant supply of forage, and the climate and conditions are those that the animal is known to thrive in. A herd introduced a few years ago into Bering island, on the Russian coast, and simply let alone and protected from dogs, has increased very much in number and will soon afford skins and tallow for export. There is no obvious reason why on most of the Aleutian Islands equally good results should not be obtained. Some few deer were introduced upon the island of Amaknak, in the bay of Unalashka, a few years since, but they were the property of whites, not natives, were not protected from the numerous dogs of an adjacent settlement, and have not thriven.

When the time comes, and it seems not far away, when the natives realize that they must depend on the deer to replace the vanishing fur animals as a source of income, and when they can acquire property in deer, I believe the result will be all that could be wished.

In closing this summary of early conditions in the Territory and of the events which enabled them to be observed, it may not be out of place to summarize also the results of the scientific work of those years. Of course, only the more important points can be alluded to. As the Western Union Telegraph Expedition ended by a withdrawal from the country, and was the occasion of a large expenditure of money with no return to its promoters, no general report was ever officially prepared, and the work of the scientific corps was made known piecemeal in various technical journals. The published results were associated in the minds of students with the individual authors rather than with the expedition as a whole. The subsequent work under the auspices of the Coast Survey, which in fact grew out of the work done or attempted in the earlier exploration, has been, so far as it was geographical, regarded very naturally as incidental to the usual work of that bureau, and so far as it has been of other sorts has not been connected in the public mind with any organization in particular. The fact that the Revenue Marine, the Army and Navy, the Signal Service and several unofficial organizations or individuals have carried out praiseworthy explorations with most excellent results has led to the further obscuration of the earlier work as a connected whole. I believe no one of those engaged in it has yet attempted to

enumerate the results, either general or scientific, directly or indirectly consequent upon the expedition. The present summary may therefore serve a useful purpose.

The most important result which indirectly came about from the explorations by our parties was the acquisition of Alaska by the United States. While the transfer might have been proposed and the question discussed if there never had been any telegraph expedition, yet I believe, in view of the opposition which existed in Congress and the cheap ridicule of part of the daily press, that if it had not been for the interest excited by the expedition and the information which its members were able to furnish to the friends of the purchase the proposition would have failed to win approval.

But, leaving such questions apart and considering merely the scientific results, the expedition made weighty additions to geographical knowledge. To it we owe the first mapping of the Yukon from actual exploration, adding to the list of American rivers one of the largest known. Old maps of North America made the Rocky mountains extend in nearly a straight line northward to the Polar sea. Our explorations showed that the mountains curved to the westward, leaving a gap to the northward through which the Canadian fauna reached to the shores of the Pacific and Bering sea. The general faunal distribution of life at this end of the continent in its broader sense was settled then and there. A general knowledge of the country, till then practically unknown except to a few fur traders, was obtained and made public. To the Coast Survey work of 1871–'74 we owe some forty charts, a large proportion of which are of harbors or passages never previously surveyed. In preparing a Coast Pilot of southeastern Alaska, while that part of it useful to navigators was in the nature of things rapidly superseded, yet the work, being conscientious and thorough in the matter of names, practically settled the geographic nomenclature of that region for all time. The myth of a branch of the Kuro Siwo or Japanese warm current running north through Bering sea and strait and producing open water in the Polar sea still lingers in some dark corners of geographic literature; but our researches, covering actual observation, the whole literature, and scores of old manuscript logbooks, conclusively show that there is no such current as that referred to, and that the currents which do exist have no connection whatever with the Japanese stream. Meteorological observations were kept up in all those years, and afterward a complete synopsis of all the recorded meteorological data for that region was prepared and issued by the Coast Survey with abundant illustrations. One of the results of the magnetic observations made by our party, in the endeavor to correct the discrepancies between the variation of the compass needle as shown on the charts of Bering sea and strait and those observed by present navigators, was the discovery that the needle had reached its easternmost elongation and had for some time been receding in the amount of its variation. In gathering confirmatory data during 1874 and 1880 more than forty stations in all parts of the Territory were occupied. As in the case of the meteorology, the literature and all practicable sources were ransacked for magnetic records,* and these, with our own observations, were utilized in the excellent discussions of Alaskan magnetism by Dr. C. A. Schott.

In geology we were tutored before sailing in 1865 by Prof. Agassiz and carried with us a written schedule of observations to be made on the glaciers. Our explorations showed that north of the Alaskan moun-

*This work was almost entirely done by Mr. Marcus Baker.

tains, as in some parts of Siberia, there are no glaciers, and there has been no glaciation in the ordinary sense, but that in its stead we have the singular phenomenon of the Ground ice formation, a state of affairs in which ice plays the part of a more or less regularly interstratified rock, above which are the clays containing remains of the mammoth and other animals, showing that they became extinct not because of the refrigeration of the region, but coincidently with the coming of a warmer climate.

In anthropology, in addition to large collections obtained from the living tribes, vocabularies, etc., the names and boundaries of all the tribes were obtained for the first time, the Eskimo were shown to exist on the Asiatic coast as immigrants driven by war from America, and a very ancient confusion of these people with the Asiatic Chukchi was definitely cleared up. The data obtained in regard to the various branches of the Eskimo stock brought welcome confirmation to the theory of Rink on the origin of this people—a theory which would probably have been by this time more widely known if it had been more sensational and less scientific.

The patient examination of many village sites, shell heaps, and middens throughout the Aleutian chain resulted in the discovery that the successive strata, judged by the implements found in them, showed a gradual progress in culture from that of the lowest, a crude Eskimo type, to that of the uppermost stratum, which contained the evidences of Aleut culture of the type immediately before their subjugation by the Russians. This was, I believe, at that time the first instance in which the paleontologic method, if I may call it so, had been applied to the study of American shell-heaps.

In biology the first object of the work planned by Kennicott had been the determination of what constituted the fauna and flora, and from that knowledge the determination of the relations between the Asiatic and American assemblies. This was accomplished in essentials, though it need not be said that the details will still supply an opportunity for study for many a year to come. The enumeration of the greater part of the population of mammals, birds and fishes has been accomplished and the plants have been fairly well collected, so that we know that the fauna and flora, deduction being made of circumboreal species, are essentially American and not tinctured to any marked extent with Asiatic ingredients. Among the lower animals the brachiopods, hydroid zoöphytes and corallines; part of the sponges; the limpets, chitons and nudibranchs among the mollusks, have been monographically studied. The crustacea, insects, and a large part of the the mollusks yet remain to be worked up in a similar manner.

To close the record of achievement, I may mention the biblography of Alaskan literature, prepared by Mr. Baker and myself, which, up to May, 1879, when it went to press, comprised 3,832 titles in eleven languages. Since it was published by the Coast Survey nearly as many more have been accumulated, and the list probably will continue to increase from year to year.

Since my field work closed, in 1880, Alaskans have not been idle. The prospector has invaded the recesses of the land, and surveys, explorations and mountaineering have been almost constantly carried on. The tourist has discovered the country and written books which, although they have the resemblance of one pea to another, have nevertheless carried tidings of Alaska to most corners of the Union. Alaska in one sense is no longer unknown, and she is even beginning to be understood and appreciated. The missionary has been up and down in the land, and has done much good in many ways, not without occasional mistakes.

It was, therefore, with curiosity as well interest that I returned to the Territory last May, after an absence of fifteen years. In looking back on the summer's experiences, a comparison between the Alaska of 1865 and that of 1895 naturally suggests itself. I was rash enough twenty-five years ago to indulge in prophecy as to the future of the Territory. I did not count on the inertia of Congress or the stupidity of officials, as I might now. Nevertheless progress has been made, and a summary of present conditions, perhaps even a peep into the future, is not inappropriate at this time.

Since 1865 the fur-seal fishery has risen, produced its millions, and declined to a point where its close in a commercial sense may almost be predicted. The first fisherman sought the cod in that year, and a modest fleet has kept the business going ever since, with more or less fluctuation in the catch. The salmon canner was then unknown, but has since invaded nearly every important fishing site. The placer miner has developed and exhausted the gold of the Stikine region, and pushed on to the head waters of the Yukon and its affluents. The clink of the drill and the monotonous beat of the stamp mill are familiar sounds on the quartz ledges, which in 1865 lay peacefully under their blankets of moss. The whaling fleet has laid its bones on the sandy bars of the Arctic coast, while the innovating steam whaler has pushed its way past Point Barrow into the very fastness of the ice at Herschel island, to find, in its turn, its occupation gradually passing away. The imperial sea otter is on the way to becoming a memory, and the Aleuts, his persecutors, are not unlikely to follow him.

As regards the inhabitants of the Territory, a complete change is conspicuous. Some thousands of white fisherman, hunters, miners and prospectors are now scattered along the coast and rivers, on the whole a hard-working, orderly set, with here and there a rascally whisky smuggler or a stranded gentleman. Apart from a few mining camps, the parasites who live by the vices of others are few. A country where he who would live must work is not attractive to them. Cut off from direct contact with the rest of the United States, Alaska is really a colony and not a frontier territory in the sense usually understood. As such, its needs should have been the subject of study and appropriate legislation, the neglect of which by Congress so far is bitterly and justly resented by the entire population. Into political matters I shall not enter, but must observe that among the numerous ill-paid officials few are well prepared to handle all the difficult questions presented in such a community, and the executive, such as it is, is without the legal authority or the proper facilities for governing or even visiting the greater part of the region it is supposed to control. The state of the law is uncertain, the seat of authority obscure, divided illegitimately between naval officers, the revenue-cutter service, and a powerless Governor, who, whatever his wishes and intentions, is not permitted by the law to control anything. If it were not for the orderly character and good sense of the white population, the Territory might easily become a pandemonium. This condition of things is disgraceful, and reform is urgently needed.

The change in the native population of southeastern Alaska is very marked. In a general way a similar change has taken place all over the Territory. The primitive condition of the natives has almost wholly disappeared. The turf-covered hut has given way to frame shanties; log houses are rarely built; the native dress has disappeared, replaced by cheap ready-made clothing; native manufactures, utensils, weapons, curios, all are gone, or made only in coarse facsimile for sale to tourists; the native buys flour and tea, cooks his salmon in a frying pan, and catches his cod or hali-

but with a Birmingham hook and a Gloucester line. In the whole of southern Alaska, thanks to the schools, the children and many young people speak fairly good English. If the present influences continue, another generation will see the use of English universal and the native languages chiefly obsolete. The day of the ethnological collector is past. Southeastern Alaska is swept clean of relics; hardly a shaman's grave remains inviolate.

In other parts of the Territory the same is more or less true. The native population is focusing about the commercial centers. The people gather where work and trade afford opportunities, and I have seen more than one pretentious church standing empty among the abandoned houses of a formerly prosperous village. There is some admixture of blood in marriages between the often attractive 'Creole' women and the incoming settlers. These marriages are often very fruitful, but the pure-blooded natives seem to be diminishing. The Aleuts, whose census is accurately made annually by the Greek Church, are distinctly losing ground, and will doubtless pass away in a few generations. The same is probably true of the Tlinkit people. As we approach the Arctic region, changes of all sorts are less marked and civilization has had less effect. Here the subsistence of the natives presents serious and increasing difficulties. Their natural food supply has been practically destroyed by the whites and by repeating firearms, of which the natives have many. The whales are almost extinct, and the whaling fleet itself is nearly so. The walrus preceded the whale, and the hair seal has never been sufficiently abundant in this region for a sole resource. The chief salmon streams are or soon will be monopolized by the whites near the sea, and the natives of the upper Yukon will go hungry. The present law allows unrestricted fishing to the natives and a close time of one day a week for the whites. The latter hire the natives to fish during the prohibited day, and so the salmon have no close time. Where a salmon stream is monopolized by one firm, they do not usually cut their own throats by taking all the salmon, but where there are several competing firms there is little respite for the fish.

The cod fishery was for some years carried on by two competing firms, who have now composed their differences. They had salting stations on shore, and bought fish at so much a thousand from fishermen, who used small sailing vessels or dories and fished near shore. Now it is found cheaper and, for other reasons, preferable to return to the older system of fishing in the open sea from a sea-going vessel, as on the banks at the East. The preparation of the Alaska fish has often been hasty, careless and inferior to that done in the East; so Alaska codfish, originally of equal quality, are less esteemed commercially than the Eastern cod. For some reason I do not understand the Pacific Ocean at best offers but a small market for fish under present conditions, and so I look to see the codfishing industry develop slowly and perhaps be the last, as it is, in my opinion, the most substantial and important of the resources of the Territory. At present the salmon are commercially more important, but unless more effectively supervised and regulated they will meet with the same fate as the fisheries of California and the Columbia river. There should be a resident inspector at every important fishery, and as the business is carried on for at most two or three months in the year, a vigilant inspection by a cutter or fisheries vessel told off for this especial work would counteract any tendency to bribe the resident inspector. I have seen 3,500,000 pounds of canned salmon taken in one season from one small stream, representing at least 5,000,000 pounds of eatable

fish, and it seems that an annual supply of the best fish food like that is worth preserving; but if the work is to be put into the hands of the lowest class of political appointees, instead of intelligent experts, making the offices will not save the fish.

In the matter of furs we may regard the fur seal fishery as doomed. It is probable that few of the pelagic sealers will pay expenses after this season, and two or three years are likely to see the end of the business. It is costing us much more than the catch is worth now, and the most sensible way of ending the matter is generally felt to be the destruction at one fell swoop of all the seals remaining on the islands and the abandonment of the business.

The continental furs, owing to competition between traders, are now selling for nearly their full market value, and little profit can be expected from them. They are also growing more and more scarce, as the high prices stimulate trapping. The natural and satisfactory offset to this would be the establishment of preserves, such as the 'fox farms,' of which mention has been frequently made in the daily press. Many of these have been started, and the multitudinous islands offer opportunities for many more; but the business is hazardous, since there is no protection against poachers, and a very ill-judged attempt has been made by the Treasury, I am informed, to impose, in addition to the annual sum for which the island is leased, a 'tax' of $5 on each fox killed over twenty from each 'farm.' It is doubtful if the Treasury is entitled to tax anybody without the explicit authority of Congress, and a tax of 50 per cent. on the gross value of the product not only is oppressive and exorbitant, but will put a stop to a business which should be encouraged.

The timber of Alaska, though by no means insignificant, is not likely to be much sought for, except for local purposes, for many years. I may point out, however, that there are millions of acres here densely covered with the spruce best suited for wood pulp, and plenty of water power for pulpmills, so that this resource is not without a future.

A forthcoming report of the United States Geological Survey will treat of the existing and prospective mining industries.

To sum up, it may be said that the whaling and sealing industries of Alaska are practically exhausted, the fur trade is in its decadence, the salmon canning in the full tide of prosperity, but conducted in a wasteful and destructive manner which cannot long be continued with impunity. The cod and herring fisheries are imperfectly developed, but have a substantial future with proper treatment. Mineral resources and timber have hardly been touched. No business-like experiment with sheep or cattle on the islands has been tried by competent hands, while the introduction of reindeer, though promising well, is still in the experimental stage. Socially, the Territory is in a transition state, the industries of the unexploited wilderness are passing away, while the time of steady, business-like development of the more latent resources has not yet arrived. The magnificent scenery, glaciers and volcanoes make it certain that Alaska will in the future be to the rest of the United States what Norway is to western Europe—the goal of tourists, hunters and fishermen. Agriculture will be restricted to gardening and the culture of quick growing and hardy vegetables for local use. The prosecution of most Alaskan industries being in untrained hands, failures and disapointment will no doubt be frequent, but when the pressure of population enforces more sensible methods, the Territory will support in reasonable comfort a fair number of hardy and industrious inhabitants.

WM. H. DALL.

CURRENT NOTES ON ANTHROPOLOGY.

RELATION OF THE BRAIN AND SPINAL CORD IN MAN.

Some interesting facts were developed by Prof. Ranke at the last meeting of the German Anthropological Society, in relation to the relative weights of the brain and spinal cord in man.

It is well known that man has not the heaviest brain of any animal; the whale and elephant have heavier. Nor has he the heaviest in proportion to his weight; some singing birds, various small apes, and the mole have proportionately heavier brains. What Ranke brings out is that the weight of the human brain is much greater in proportion to the weight of the spinal cord than in any other vertebrate; and this, therefore, constitutes an anatomical distinction of man, strongly contrasting him with all other animal forms.

The article of Prof. Ranke may be found in the 'Correspondenzblatt' of the Society.

THE MAN FROM GALLEY HILL.

So long ago as 1888 Mr. Robert Elliott exhumed some human remains from the 'diluvial' gravel at Galley Hill, Northfleet, Kent, England, in immediate contiguity to 'palæolithic' implements. The remains were first described by Prof. Newton before the Geological Society of London, last year. The skull is markedly dolichacephalic, its index being 64; the forehead is low and retreating, the supraorbital ridges prominent; the chin is also retreating; the individual's height, calculated from the femur, was about 1.60 meter. In some respects, the remains were noticeably similar to those found at Spy, Belgium.

It must be said, however, that little value can be attached to these relics. The gravel deposit where they were found is now destroyed; they may have been a later burial in the gravel; years have elapsed since their exhumation during which time the finder concealed the discovery. Mr. Elliott has no one but himself to blame if men of science decline to accept the accuracy of his observations at this date. Let it be a warning to others to be more careful and more liberal.

D. G. Brinton.

SCIENTIFIC NOTES AND NEWS.

A GIGANTIC ORTHOCERATITE FROM THE AMERICAN CARBONIFEROUS.

It is a well known fact that the straight-shelled cephalapod was an abundant form of life during Paleozoic times. This is attested by the large number of species that have been described, those of the Orthoceras group alone numbering upwards of twelve hundred. The culmination and greatest expansion of the group was in the Silurian, and from that period it appears to have gradually dwindled in number of species, size and abundance, until at the close of the Paleozoic the form was all but extinct. In the American Silurian some of the shells attained huge proportions; but with the general decline of the group the later ones have heretofore seemed to rapidly become dwarfed until only small unimportant individuals were recorded after the Devonian.

In the Carboniferous a few dimunitive species have been described, none of them being more than a few inches in length. In the Coal Measures of the Mississippi basin the remains found were of rather rare occurrence, imperfectly preserved and of very small size. Seldom did the shells exceed six inches in length, and half an inch in diameter.

Of late years, however, some unusually fine material has been obtained in the black shales of the Lower Coal Measures in the vicinity of Des Moines, Iowa. Several of these shells were so large as to excite considerable wonderment. They were over two feet long and one inch in diameter at the larger end. These were thought to be giants of their kind and day.

Recently there was found in one of the coal mines at Fansler, in Guthrie County, Iowa, about forty miles from Des Moines, an Orthoceras shell of gigantic proportions, by the side of which all the other Carboniferous species of

the genus are mere pigmies. This specimen is three inches in diameter; and as it is of the same very slender type as the associated forms it could not have been less than six feet in length, and probably was even longer. The species is *O. fanslerensis*.

CHARLES R. KEYES.

ASTRONOMICAL.

THE last German mail has brought copies of the report made by Prof. Albrecht, of Potsdam, at the last meeting of the International Geodetic Committee on the subject of Variation of Latitude. The report contains much interesting matter. There is a summary of all the observational material gathered since 1890 and arranged in the form of monthly means for each observing station. The results are then discussed in such a way as to lead to a final table in which the difference between the mean and instantaneous latitudes is given for every tenth of a year and for every thirty degrees of longitude. The results are stated to be provisional only, because several of the observatories have not yet furnished definitive reductions of their observations. This want will no doubt soon be supplied. The results of the observations made at Columbia College, New York, which are among those not yet reduced, are particularly needed, according to Prof. Albrecht, because they alone can raise the determination of the y-coördinate of the instantaneous pole to sufficient precision. The most important result reached by Prof. Albrecht is summarized in the following words: "The phenomenon of the polar motion proves to be too complicated to admit of complete representation by means of a formula containing several terms. This having been proved, we may regard it as settled that we have at the present time only reached the stage of a first approximation to a knowledge of the phenomena in question. We should regard the problem, therefore, as very far from solved, and must devote to it our full attention."

IT will, perhaps, be of interest to astronomers and others interested in complicated calculations to learn that it is possible now to obtain a computing machine of the very highest capability at a very small price. The 'Brunsviga' machine, made by Ernst Schuster, Schöneberger Ufer, Berlin, costs only seventy-five dollars, and gives a product of thirteen figures. That is to say, two numbers, each containing six figures, can be multiplied together. These machines can be imported duty free by educational institutions. Three of them are in continual use at the observatory of Columbia College, New York, where they give the greatest satisfaction.

H. J.

PHYSICS.

UNDER the title *Ueber die Doppelbrechung der Strahlen Electrischer Kraft* (Wied. Ann. Vol. 56), p. 1, 1895, Mr. Lebedew describes the apparatus and methods of obtaining very short Hertz waves, $\lambda = 0.6$ cm., together with convenient arrangements for showing polarization, interference, rectilinear propagation, reflection and refraction. He was able even to obtain crystals large enough to show double refraction, and constructed Nicols prisms of sulphur crystals cut correctly and set together with a film of ebonite. Using these Nicols he was able to repeat the usual tests between crossed Nicols in light, even producing a plate of sulphur which showed phenomena similar to those with the $\frac{1}{4}\lambda$ mica plate. These very short waves make many experiments not only possible but simple.

MR. K. OLSZEWSKI has applied a method (Wied. Ann. Vol. 56, p. 133, 1895) which he calls the expansion method, to the determinations of low temperatures and has compared the results with those obtained with a hydrogen thermometer. The results are as follows:

Tension of oxygen	Temperature determined by hydrogen thermometer	Temperature of the liquid oxygen determined with the platinum thermometer, using the expansion method,
50.8 atm. (critical pressure)	−118°.8 C. (critical temperature)	−118.° to −119°.2 C. (critical temperature)
32.6 atm.	−130°.3	−130°.
19. atm.		−140°.5
10.2 atm.	−151°.6	−152°.
1.atm.	−181°.4 to −182°.7 (boiling point)	−181°.3 to −182°.5 (boiling point)

W. H.

THE HUXLEY MEMORIAL.

THE general committee report that since the first meeting on the 27th ult., which

was fully reported in this journal, two meetings of the executive committee have been held. At the first of these, at which Lord Shand accepted the office of chairman, it was reported that a number of foreigners of eminence had expressed a wish to be associated with the proposal to commemorate Mr. Huxley's distinguished services to humanity. It was resolved, in the first instance, to invite subscriptions from the members of the general committee. At the second meeting, held on Wednesday, it was reported that the subscription, which at the general meeting had amounted to £557, had been increased to about £1,400, and it was resolved that a wider appeal for subscriptions should now be made to the friends and admirers of Mr. Huxley amongst the general public. The honorary secretary stated that in America committees were in the course of being formed to promote the realization of an adequate fund. The committee resolved to communicate, by means of a sub-committee of their number, with Mr. Onslow Ford, R. A., who had the advantage of being well acquainted with Mr. Huxley, in reference to the statue, which it is proposed should be erected beside those of Darwin and Owen in the Natural History Museum, South Kensington. The extent to which the committee may be able to carry out the other intended objects of founding exhibitions, scholarships, and medals for biological research and lectureships, and possibly in assisting the republication of Mr. Huxley's scientific works, will of course depend on the subscriptions which may now be received. These may be sent to the treasurer, Sir John Lubbock, or the bankers, Messrs. Robarts, Lubbock and Co., 15 Lombard street, E. C.; or to the secretary, Professor G. B. Howes, Royal College of Science, South Kensington. The amount received to December 20 is £1,535.

CONCILIUM BIBLIOGRAPHICUM.

We have now received the official prospectus of the card catalogue of zoölogical literature, the plans for which have on several occasions been mentioned in this journal. The Bureau is located at Universitäts Str. 8, Zurich-Oberstrass, Switzerland, under the direction of Dr. H. H. Field and the control of an international committee nominated at the recent Congress of Zoölogy. The Bureau will print a prompt catalogue of all zoölogical papers, whether published separately, or as articles in scientific journals. For the first year a subscription rate has been chosen which would barely cover the cost of printing (not of compilation nor of sorting) on an estimate of 100 subscribers to the whole set of cards. If this number cannot be reached, then the Bureau will be obliged, not merely to pay for the work of sorting and sending, but must also advance money to pay the deficit on the printing. If, on the other hand, 200 subscribers for the whole series can be secured, the card catalogue division of the Bureau's work would probably be self supporting, and any further increase might be used towards improving the material or towards reducing the price. In no case, however, will any profit be realized on the operations of the Bureau.

The entire set of cards is offered for sale at the rate of $2 per 1,000 cards (not including transportation), and it is estimated that about 8,000 cards will be issued during the first year. Special groups of cards, systematic or morphological, may be subscribed for at increased rates.

The Card Catalogue constitutes a special edition of the *Bibliographia Zoologica*, itself a continuation of the bibliographical part of the *Zoologischer Anzeiger*. This latter journal forms the connecting link with the *Bibliotheca Zoologica* of Engelmann, Carus und Engelmann, and Taschenberg, constituting an unbroken bibliography from the earliest times down to the present day. By a most fortunate arrangement with the eminent director of the *Zoologischer Anzeiger*, Prof. Carus will remain editor-in-chief of the *Bibliographia Zoologica*.

The Bureau will begin issuing an Anatomical Catalogue, the *Bibliographia Anatomica*, early in 1896, and arrangements will also be made for physiology, provided these two first experiments meet with success. The Botanical Section of the A. A. A. S., impressed with the importance of founding a similar bureau for botany, appointed at its last session an influential committee to study the working of the Zoölogical Bureau and to make arrangements for the estab-

lishment of a federated Bureau for Botany. It is, moreover, almost certain that a similar step will be taken in Brussels for yet other sciences by a powerful organization founded under the patronage of the Belgian government. It is, therefore, not excessive optimism to predict that it may be possible to realize in 1900 the great project of the Royal Society of London.

GENERAL.

IN the December number of Entomological News, Mrs. Annie T. Slosson gives a list of insects and spiders captured on or near the summit of Mt. Washington, N. H. With two previous lists, already published, the number of species foots up to 830, all taken at or above 5,500 altitude. This number does not represent the total fauna of this interesting region, as a number of Coleoptera, collected there by Mr. F. C. Bowditch, are not included. At first sight it appears surprising that so many insects should be found at such an altitude. However, it appears that the list includes, besides those indigenous to the climate and found in Labrador and northward, many living throughout the New England States, and doubtless not breeding on the summit of the mountain. The peculiar position of the peak, isolated in the midst of a temperate climate and of small extent, must facilitate the frequent occurrence of almost any of the more active insects from the surrounding valleys. To this fact, as well as to Mrs. Slosson's industry in collecting, her success may be attributed.

HARRISON G. DYAR.

THE editorial board of the *Astrophysical Journal* has decided that the Roland scale of wave-lengths, the ten millionth of a millimeter as a unit in which wave-lengths shall be expressed, the kilometer as the unit to be used in measurements of motion in the line of sight, and the nomenclature proposed by Vogel and Huggins for the hydrogen series be adopted. It also favors printing maps of spectra with the red end on the right and tables of wave-lengths with the shorter wave-length at the top. These standards will be used in the *Astrophysical Journal*, and it is hoped that they will be generally adopted.

THE annual meeting of the New York Zoölogical Society was held on January 7th, and the following officers were re-elected: President, Andrew H. Green; First Vice-President, Charles E. Whitehead; Second Vice-President, J. Hampden Robb; Treasurer, L. V. F. Randolph; Secretary, Madison Grant. The committee on a site for the new zoölogical garden reported that D. G. Elliot, of the Field Columbian Museum; A. E. Brown, of the Philadelphia Zoölogical Garden, and Frank Baker, of the Washington Zolöogical Garden, had examined the eligible sites in the city parks and regarded most favorably Van Cortlandt Park. It is the intention of the society to establish a garden in which the animals will not be closely confined but placed as far as possible under natural conditions.

AT a meeting of the American Philosophical Society on October 3d, Frederick Fraley was re-elected President and E. Otis Kendall and J. P. Lesley were re-elected Vice-Presidents. William Pepper was elected one of the Vice-Presidents in place of the late W. S. W. Ruschenberger. The Secretaries elected are: George F. Barker, George H. Horn, Patterson DuBois and Persifor Frazer.

ARRANGEMENTS are being made for the annual reception and exhibition of the New York Academy of Sciences, which will be held at the American Museum of Natural History and probably early in March. Professor H. F. Osborn is chairman of the executive committee and seventeen sciences are represented on the committee of arrangements. It is hoped that the coöperation of institutions outside of the city of New York may be secured to a greater extent than hitherto in the exhibits.

WE have received a list of the prizes conferred by the Paris Academy of Sciences on December 23d. These are too numerous to give in detail in this journal, but it may be interesting to note that the number of prizes offered is as great as sixty-nine. Several of the prizes are of the value of 10,000 fr., and one, for a method of curing an epidemic disease, is 100,000 fr. This prize was not, however, awarded this year.

IT is stated in the daily papers that Dr. John S. Billings, director of the Department of Hygiene in the University of Pennsylvania, has

been elected librarian of the Consolidated Libraries of New York, representing the Lennox Library, the Astor Library and the Tilden Bequest.

THE Botanical Library and the Herbarium of Columbia College, will be placed in a building to be erected in the New York Botanic Garden, and in return the privileges of the garden will be accorded to students of the College.

MACMILLAN & Co. announce that they will begin in September next a 'Garden craft series,' the first volume of which will be *Plant Breeding* by Professor L. H. Bailey.

THE *British Medical Journal* states that the question of founding a medical faculty in the University of Odessa, which had been long under discussion, has finally been decided in the affirmative. The municipality of Odessa has generously offered to double its grant for the new faculty, raising it from 250,000 to 500,000 roubles, that is, to over $250,000.

THE opening article in *Appleton's Popular Science Monthly* for January is a description of the origin of the Smithsonian Institution by Dr. H. Carrington Bolton. The author describes Smithson's curious career, but scarcely attempts to assign his reason for making the United States his residuary legatee. The article reviews the formation and growth of the institution, and a second article will consider its present status and many activities.

THE election of officers of the Binghampton (N. Y.) Academy of Science, held on the afternoon of January 4th, resulted as follows:

President, PROF. E. R. WHITNEY (re-elected).
Vice-President, PROF. HERBERT J. JONES (re-elected).
Recording Secretary, WILLARD N. CLUTE (re-elected).
Corresponding Secretary, BURT E. NELSON.
Treasurer, JOSEPH K. NOYES.

A reception was tendered the members in the evening by the Young Women's Christian Association at their rooms in the Strong Building.

A NEW Russian journal, a *Review of Psychiatry, Neurology and Experimental Psychology*, edited by Dr. Bekhteret, will hereafter be published monthly.

THE deaths are announced of Cavaliere Dr. Alfonso Ademello, sanitary director of the hospital of Grossetto, and known for his excavations at Grossetto and for his writings on the Maremma, of Dr. Sickenberger, professor of botany and chemistry in the medical high school in Cairo; of Dr. A. de Cerqueira Paito, professor of organical chemistry in Bahia, and of Dr. Paul Reis, professor of physics at Mainz.

UNIVERSITY AND EDUCATIONAL NEWS.

THE new catalogue of Harvard University shows the total number of instructors to be 366 and the total number of students 3,600. The students are distributed as follows: 1,771, College; 340, Scientific School; 285, Graduate School; 41, Divinity School; 465, Law School; 531, Medical School; 102, Dental School; 55, Veterinary; 15, Bussey Institute. The number of students is 310 greater than last year as compared with a gain of 134 for that year.

AFTER 1901 only college graduates will be admitted to the Harvard medical school. Johns Hopkins University is the only American University now making this requirement.

THE departments of Physics and Mechanical Engineering at Brown University have been materially improved by the removal of the work shops that formerly occupied the basement of the Wilson Physical Laboratory to a building recently constructed for their reception. The new building has thirty-six hundred square feet of floor space, and is well equipped with all the machinery necessary for thorough courses of instruction in practical metal and wood working. Of the rooms thus rendered available in the physical laboratory two are to be fitted out for high temperature and pressure investigations, two for an electrical engineering laboratory, and one for a drawing room for the department of civil engineering.

THE late Franklin Baldwin, of North Grafton, Mass., has made the following bequests to take effect on the death of his wife: Wellesley College, $50,000 to found a chair in mathematics in memory of his daughter, Katie Emma Baldwin; Smith College, Northampton, $12,000 for scholarships; The University of Vermont, $10,000 for scholarships; Dartmouth College, $6,000

for scholarships. The residue of the estate (some $20,000) is left to Clark University.

DR. C. A. STRONG, associate professor of psychology in the University of Chicago, has been elected lecturer on psychology in Columbia College.

PROF. L. S. LUTHER, of Trinity College, Hartford, has been elected president of Kenyon College, Gambier, Ohio. Professor Theodore Stirling, the professor of natural science, has been during the last four years acting president.

PROF. THEODORE VON DER GOLTZ has been appointed professor of agriculture in the University at Bonn in the place of Prof. Dunkelberg, who has retired.

DISCUSSION AND CORRESPONDENCE.

QUATERNIONS.

EDITOR OF SCIENCE: The circular letter of Dr. Molenbroek and Mr. Kimura published in the issue of your journal for October 18th appears to me to be a distinct improvement upon their preceding letter published in *Nature* for October 3d. In the former letter they assume that Hamilton's Quaternions is a much more perfect method than it really is, and they affirm that the newer forms of vector theory invented by physicists are founded on definitions which are established by Quaternions, and are systems of notation rather than logical developments of a mathematical idea. They also advise the "many who are prejudiced against the calculus of quaternions and maintain the opinion that it is hard to understand and that it contains a great deal which is useless in addition to things immediately applicable" to "approach the calculus with proper care and meekness in the assurance that they will ere long rejoice in having at their disposal an instrument of research mightier far than they had the slightest notion of so long as they were in the domain of cartesian mathematics."

In recent years I have published a series of papers on Space Analysis, the express object of which is to unify and harmonize the several vector methods with one another and with the ordinary analysis. I exclude neither the idea of a vector nor the idea of a quaternion, and I do not attempt to make Nature simpler than she really is by identifying ideas that are different though complementary to one another. I look upon vector-analysis not as an independent and rival plant, but as a development of the old tree of mathematical analysis.

The greatest impediments to the progress of the method of Quaternions are not prejudice and false opinion in those to whom it is presented, but rather imperfections, mistakes and errors in the method itself. Hamilton ought to be reverenced for what he did accomplish, but that ought not to blind us to what he did not accomplish. It is an error to identify, as Hamilton does, vectors with quadrantal quaternions. It is an error to confound, as Hamilton does, successive with simultaneous addition; for thereby he failed to discover the generalization for space of the Exponential Theorem and of Taylor's Theorem. It is a mistake to introduce, as Hamilton does, a new notation which has no relation to the established notation of trigonometry, or to adopt conventions which do not harmonize with the established conventions of analysis.

To the amended proposal for an 'International Association for promoting the study of Quaternions and allied systems of Mathematics' there is no room for objection; for it does not assume the perfection and finality of Hamilton's work, but rather invites to the development and study of vector-analysis in its broadest sense. It will, I hope, receive a favorable response from all who are interested in the development or the teaching of space analysis. It is inevitable that there should be diversity of notation and warm discussion of principles among the pioneers in this region, but inasmuch as all are zealous for the truth, the proposed association would accelerate the progress to definite decisions, and thereby smooth the way for the spread of this, the highest development of the art of algebra.

Messrs. Molenbroek and Kimura refer to the remarkable advance in Electrical theory. That advance has been due in large measure to the practical manner in which electricians have discussed the principles and definitions of their science, finally settling all definitions by an authorized Congress. Doubtless the proposed association would eventually accomplish an

equal good in its line. Electricians are alive to the importance of this work also, and the indications are that they will have much influence in its settlement.

But since at the present time there are writers on space analysis who see nothing but vectors, and other writers who identify vectors with quadrantal quaternions, and since the principles commonly accepted by Quaternionists are not free from fundamental errors, it is evident that much time is still required for the discussion of principles before definite decisions about notation can be arrived at. The notation which is adopted must be built on an adequate analysis if it is to be lasting. And here the π muddle in the system of electric and magnetic units ought to act as a warning to make haste slowly.

The logical harmony and unification of the whole of mathematical analysis ought to be kept in view. The algebra of space ought to include the algebra of the plane as a special case, just as the algebra of the plane includes the algebra of the line. And as the algebra of space includes the spherical and higher forms of trigonometry, it ought to be made to harmonize as much as possible with the existing notations and conventions of trigonometrical analysis. When vector analysis is developed and presented so as not to contradict, but, on the contrary, to include the ordinary branches of analysis, we may expect to see many zealous cultivators, many fruitful applications, and, finally, its universal diffusion. Then there will be no need of arguments to prove its utility. May the movement initiated by Messrs. Molenbroek and Kimura hasten the realization of this happy result.

ALEXANDER MACFARLANE.

LEHIGH UNIVERSITY.

SCIENTIFIC LITERATURE.

De Saint Louis a Tripoli par le lac Tchad. Par le LIEUTENANT-COLONEL P. L. MONTEIL. Paris, Alcan. 1895. Pp. x. and 463. Fifteen itinerary charts and one general map. Profusely illustrated by Riou.

This book may be considered as the fruit of the treaty between England and France which was entered into on August 5, 1890. The reason for the treaty was the necessity of fixing a boundary between the regions subject to their respective influences along an imaginary line drawn from Say on the Niger to Lake Tchad.

Monteil proposed to the French government to traverse this region, starting from St. Louis, in the French possessions on the west coast of Africa. His object was to obtain treaties with as many of the native potentates along the route as possible, and thereby fix the boundary as far as France was concerned.

He left St. Louis on October 9, 1890, with one white companion, Adjt. Badaire, and twelve natives, four of the latter deserting him quite promptly. For twenty-seven months from this time his experiences are given with considerable minuteness. He had the regulation 'ups and downs' which are the lot of the explorer everywhere, particularly in Africa. As far as Wagodogho he followed the itineraries of Binger and Crozat. Beyond this point everything was relatively unknown, except where light had been thrown upon various points along the line when his path crossed the track of his predecessors, Denham and Clapperton, Barth, Nachtigal and others.

His occupations were numerous, as he was at various times soldier, engineer, physician, botanist, astronomer, cartographer, pharmacist, trader, diplomat and magician. Photography did not prosper with him. His early attempts were crushed in Paris; where his plates going to one office and his letter of instructions to another, they were both opened separately with the consequent disastrous result to the negatives. A final blow was struck at this portion of his work when a native stole his camera, plates and all. One can imagine the 'joy and perplexity' of the average native while examining this piece of apparatus, as well as the feelings of the rightful owner under the circumstances.

The loss, however, is made good by the superb set of illustrations by Riou, which are one of the charms of the volume. The artist has so thoroughly caught the spirit of the author that, much as we regret the absence of the true copies of nature, we feel satisfied by the insight which the skillful sketches give us on the subject.

Another feature of the book which cannot be too highly praised is the series of itinerary

maps, which are inserted in the text of each chapter which is devoted to the description of a portion of the journey.

The book may be divided for practical purposes into two parts—the descriptive and the generalizing portions. His descriptions of men and things, are pleasant reading, and show us a man, wide awake to the meaning of the scenes through which he passed. Space does not permit of a detailed account of these, though many are of great interest and value. Some of the character sketches are very well done. The chapters which are devoted to his generalizations are by all means the best part of his work. They are scattered through the book and bear upon many subjects; geology, botany, natural history and anthropology all come in for a share, and while we may not agree with his conclusions, particularly upon some ethical questions, we cannot but agree that his clear statements of facts and conditions are well worthy of close attention. Some of each of these parts of the work will be referred to in this review.

He was almost uniformly successful in his diplomatic relations with the native chiefs with whom he came in contact. Sometimes under the most trying circumstances he carried his point. His French temperament seems to have been under splendid control, as it only comes to the surface when the pressure of affairs is removed and he feels free to express himself. This is greatly to his credit, and much of what might be called 'good fortune' by some is undoubtedly to be attributed to this fact.

His first treaty was made at San on January 14, 1891. Shortly after this he meets Capt. Quiquanodon and Dr. Crozat at Kinian. They reinforce his party most opportunely with both men and animals. On March 1 he reached Diasa. Here he received his last letters from France, bearing date of December 18, 1890. From this time until he reached Beni-Oulid, on December 6, 1892, he was virtually lost as far as hearing from the outside world was concerned.

An interesting description is given of Bobo-Dioulasso, where the houses are built upon high platforms, where 's'habiller est avoir quelque difformité à cacher,' and where the children are carried under a 'carapace' of rods. At Souro he has his first real encounter with fetichism, and a good idea is given of its wide ramifications and its effects upon the life and habits of the natives, as well as the consequences which hang over the innocent traveler's head who ignorantly invades the 'sacred limits' which are spread around him like so many snares.

His account of the 'whistle system' of telegraphy, as employed in the Bobo country (p. 107), is curious reading. Imagine the swarthy native taking a siesta at sunset, and carrying on a conversation by this means—arranging for a hunting party in the morning; conducting some piece of business; lovers intoning their pure love ditties; enemies challenging one another, etc., etc., for of such is the 400 of Bobo.

The Mossi country is described on pp. 121 *et seq.* This region on the bend of the Niger, is occupied by a well organized people whose traditions carry them back to the beginning of the world, without exactly fixing the date of this event. Naba, the first of the race, had 333 sons, and divided his kingdom among them at his death. Wagodogho is the seat of the main head of the whole kingdom, and the Naba of this place is the Naba of the Nabas. He wears as an emblem of his proud preëminence, a special head dress which is a species of three decked turban; but this with his very numerous harem, seems to be the limit of his prerogatives.

He reached Wagodogho on April 28, only to be ordered out of town. Protests that he was the envoy of the *king* of France were of no avail. Eventually, a music box, a Persian saddle and a sword, did the business for him, and he was received as a man and brother. He reached Dori on May 22d, and it was high time that he did so, for this was one of the very low points in his curvilinear career. Things were at a very low ebb with him at this point.

While resting at Dori, on what might be called the boarder line between the civilized and the uncivilized nations of central Africa, he gives us a sketch of the relations of Mohammedanism to progress in this part of the world. It seems strange to find him favoring polygamy and slavery, and expressing the opinion that the religion of Islam is so adjusted to the con-

ditions of the country that if peaceful means had been used for its propagation, instead of force, it might not be too much to say that all Africa would now be under the sway of the Moslem faith. The bearings of the two systems of fetichism and Mohammedanism upon the peace of mind of the traveller are portrayed in a most telling manner.

The trip to Say, on the Niger, was accomplished in eight months. Just before reaching Ouro-Gueladjio he passed through one of his darkest periods, some of the journey being made on foot, his animals having been reduced by desertions and death from twenty-five to two, and his men from forty-seven to seventeen.

The question of the Saharan Sea is discussed, on page 199 and the following pages, as viewed from a structural standpoint, with reference to the large basins known as the Dalhols. The trend of these supposed branches of the extinct sea, as well as the existence of the flabelliform Egyptian palm in this exceptional locality, seem to favor the arguments advanced in the text.

Just beyond this point in the book, where he deals with the regions about Argoungou and Sokoto, we pass through one of his brighter periods. With great good fortune he happened to pass through this part of the country during a lull in the proceedings—generally in a disturbed state among these races. A few months later, he would have had a hard time indeed, even if he had escaped with his life from the political 'cloud burst' which took place over the whole of this region. His state of mind is well illustrated by the pretty sentence on page 238, upon the moral effect of sunshine. This also probably accounts for the rather rose-colored description of the Peuls which immediately follows.

In chapter X. (p. 269) there are some good character studies in the course of the account of his stay at Kano. The 'clearing house system' in use among these people is curious enough to be amusing. Articles of fixed value are traded for one another directly, but when *small change* is involved the *trader draws on his bank.* This consists in a mule load of cowrie shells, 50,000 of them composing a load and representing a total value of $10.

Kano is further the center of the cola nut trade. This article, which of recent years has been introduced into the medical pharmacopœia, is treated of in numerous aspects. The nut is found in a belt lying between 6° 30′ and 11° or 12° North Latitude; and though it may be the 'Coffee of the Soudan' and correspond in all its virtues to the betel nut in India, opium in China, the cigarette of a Spaniard, or the dog of a blind man, it can hardly be accepted as a sort of universal panacea.

At this point we come across the discussion of another phase of the slavery question, viz.: the captives of war. They are captives in name, but slaves in reality, and our author speaks of the amenities of their existence. Their masters are forced to be easy with them, for the reason that some day, through changed fortunes of war, they may in turn occupy the same position. And again, the number of these captives is so great, as contrasted with the number of the freemen, that an insurrection might change the order of things. Such occurrences are not unknown in the political or domestic life of this untamed Eden. The captive is usually held by his captor for a few months, until some mart is reached where he can be disposed of, if he survives the harsh treatment of the march thither. Then, if he is intelligent, he is pushed forward rapidly and can attain to high positions. He is provided with a wife, and his lot becomes settled if he has a family, as neither he nor they can be sold. It is often a matter of good fortune into whose hands he falls. In some instances we read of the 'Captives of the Crown, as being placed in charged of great undertakings and expeditions of all sorts in the Soudan. Hence, at least, so we are told, 'the captive is a social and economic necessity in the Soudan.'

From Kano he sends a courier to Tripoli in the month of January, 1892, and proceeds onward to Kukawa on Lake Tchad, which point was reached on April 10th. His description of the stay at this place, which covered some three and a-half months while he awaited the formation of a caravan to proceed northward, contains many bits of information of value. Here he was subjected to the infamous practice, in the way of the extortion of gifts, which was the means of almost ruining Barth and Nachtigal. Both of these travellers were stranded in

this region by similar delays, and their life blood extracted by the polite but very costly exchange of 'gifts.' Monteil had learned a lesson from their experience, and, secreting sufficient means to carry him through, 'played poor.' The consequences were evident in the great privations to which he was subjected for some time after this. At length his opportunity arrives, a caravan is ready to leave. He makes the sheik a series of presents as farewell gifts, which greatly embarrass that individual to properly and adequately return, which was his immediate duty. The tide was turned in his favor, and he got everything he wanted, and thus escaped this new species of danger with safety.

He speaks very caustically of the rotten and shaky condition of the affairs of Bornu, of which state Kukawa is the chief city. It took only a few months for his prediction of the fall of this empire to be verified.

On August 15, a year after leaving the Niger, he starts on the journey to Tripoli. The caravan of 78 camels, 7 horses, *30 men* and *30 slaves* must have presented a fine appearance, and their minds must have been much lighter as they started upon the last stage of their trip. Aside from the discussion of the usual tribulations of the long journey over the Sahara, and a rather pathetic description of the evil works of the 'demons of the desert who lead travelers astray,' nothing novel is given in this part of the book.

On December 10, 1892, he reached Tripoli, where his troubles were over. He was welcomed in France in the most cordial and well-deserved manner. His promotion, his medals and other honors have certainly been well earned, and they grace a hard-working, earnest and modest man. The volume contains much more valuable material than is usually found in a book of travels, particularly when written by one who is rather more of a military man and diplomat than a scientist. W. L.

A Laboratory Course in Experimental Physics: By W. J. LOUDON and J. C. MCLENNAN. Macmillan & Co. 8vo., 300 pp. Price, $1.90.

This book is written by the Demonstrater and the Assistant Demonstrater in Physics in the University of Toronto, and it is evidently designed to meet the special requirements of students in that institution. It is divided into two parts, constituting an elementary course and an advanced course. Part I includes a brief treatment of length-measuring instruments, vernier, cathetometer, spherometer, etc., which is followed by some exercises in density determinations, experiments with pressure and volume of gases and a little about capillarity. The remainder of the elementary course is mostly given to geometrical optics, although there is something of a treatment of photometry and a few exercises in specific and latent heat. The second part treats of acoustics, heat, electricity and magnetism, with a short appendix on gravity and the pendulum. An elementary knowledge of dynamics and the calculus is assumed in the advanced course. In the various experiments described it is generally assumed that a perfectly adjusted piece of apparatus is at hand ready to be set going. The instruments figured and described in the 'acoustics' are from the *atelier* of Rudolph Koenig, and nearly all of the illustrations in the book appear to have been made from perfectly constructed and finished apparatus. It is generally admitted that a large part of the value of the training in a physical laboratory comes from experience in designing, constructing and adjusting apparatus for definite purposes. In no other way can a student so quickly and thoroughly learn the sources of error entering into an experiment, or the methods of eliminating them and in a general way become familiar with the limits of accuracy to which he is restricted. Viewed from this standpoint, such a system as seems to be implied in this book is not to be commended. In fact, it is a little difficult to know under what conditions this book is intended to be used. The authors say in the preface that it owes its origin to the 'difficulty experienced in providing, during a limited time, ample instruction in the matter of details and methods' * * * 'at the present day, when students are required to gain knowledge of natural phenomena by performing experiments for themselves in laboratories.' Although not quite definite, this seems to imply

that students are expected to acquire such knowledge of physics as they get, by the use of this book, and many pages of the text appear to strengthen this view. A decade or more ago it was quite a popular notion that the way to treat physics was to begin, especially if the learners were young children, with laboratory exercises. The student was to find everything out for himself, and all the great truths of physical science were to be rediscovered every day in the secondary schools. No greater farce than this was ever enacted, for it was *seriously* approved and attempted by many of the great masters of pedagogy. It has now joined the host of other abandoned theories, at least as far as those who really teach physics are concerned, and it cannot be assumed that it still survives, or indeed, that it ever existed at the well-known institution from which this book came. It must be, therefore, that the volume is intended to be used as a guide in laboratory practice which supplements text-book and lecture instruction. From this standpoint the text contains much that might well be omitted, for it must almost necessarily have been included in the text-book or lecture work; and, although the plan may, and doubtless does, suit the scheme of instruction and available facilities in the institution in which it was prepared, a wider constituency could be served by assuming fewer perfectly made instruments and throwing the student on his own resources to a greater extent, in the matter of adjusting, designing and assembling the apparatus he is to use.

The Intellectual Rise in Electricity. By Park Benjamin. D. Appleton & Company. 8°. Pp. 600.

In the preparation and publication of this volume Mr. Benjamin has done a work for which all interested in physical science, and especially in electricity, will thank him. In these days few men capable of properly recording the progress of scientific discovery possess, at the same time, the instinct of the historian to a degree necessary for the making of a book like this. Few will deny that a knowledge of the history of a discovery, the circumstances and conditions under which it was made, and particularly the personality of the discoverer, add enormously to the interest of the fact itself and, besides, has its practical value in serving to fix the fact more definitely and more lastingly in one's memory. In the preparation of text-books the historical and biographical inclinations are usually either entirely suppressed or held severely in check and the student who depends on them alone, finds only the cold facts, presented in their logical or scientific sequence and stripped entirely of the charm of personal and chronological relationship. The wise instructor makes up for this deficiency and to him Mr. Benjamin's work will be doubly welcome. In making it an enormous amount of labor has been expended in the consultation of original sources of information, of many ages and many tongues. It is practically a history of electricity and magnetism from the earliest traditions to the end of the last century. But the history of one branch of science is like the history of one nation or one race; it cannot be written alone, and this book of necessity involves a study of the development of all physical science. When one recalls the names that appear, Thales, Aristotle, Archimedes, Roger Bacon, Peregrinus, Porta, Cardan, Gilbert, Galileo, von Guericke, Boyle, Hooke, Newton, Halley, Gray, Nollet, Franklin, together with many others, it becomes clear that in telling their lives one must tell the history of natural philosophy, and the history of natural philosophy is largely a history of the intellectual development of the world. This doubtless suggested to the author the peculiar and rather unfortunate title which he has fixed upon his work. The account begins with a chapter on the earliest traditions relating to the 'amber phenomenon' and to the lodestone, which have always been considered as in some degree related to each other, and a knowledge of which may have existed among prehistoric people. What was known among the Chinese, early Egyptians and Greeks is discussed and the subject is followed in its emergence from the periods of myth and legend or tradition to that of real and fairly authentic history. The discoveries of Columbus are discussed and two excellent chapters are devoted to the work of Gilbert, the real father of the science. The relations of Francis Bacon and Gil-

bert are gone into with considerable detail and a number of important facts brought out which will probably be new to most physicists, who are not likely to have made a critical study of the origin and sources of Bacon's philosophy. Many of them will doubtless feel inclined to rocommend to those admirers of the great chancellor who are trying to prove that he wrote the plays of Shakespeare the desirability of diverting their energies into an investigation of the authorship of the *Novum Organum*.

There is a good account of the founding of the Royal Society of London and of the electrical and magnetic work of Boyle, Newton and Halley.

The concluding chapter is devoted to a presentation of the discoveries of Benjamin Franklin, in which, of course, will be found references to many other contemporaneous electricians.

The work is distinctly a history. No technical preparation is required to read it and it is free from all mathematical or other discussions which might involve difficulty. The style is in the main excellent, but marred occasionally by excessive exuberance and diffuseness. An example of this is found in the several pages devoted to the story of Franklin's kite experiment, a very small part of which reads as follows:

"Quietly Franklin is arranging the silk ribbon and the key. This done he watches the cord close to him. There is no sign yet to guide him. Has he failed? Suddenly he sees the little loose fibres of the twine erect themselves. He has not failed, but the moment has come. Without a tremor he advances his knuckles to the key. And then a little crack, a little spark —the same little crack and the same little spark which he had taken a hundred times from his glass tube—and the great discovery is complete, his name immortal."

As a matter of fact, this kite experiment was quite unnecessary to establish Franklin's claim, which had before been put to the test in France, and Franklin's fame would have been quite as great without it, although unquestionably less picturesque. The experiment was interesting and not without dramatic quality, but, on the whole, a description of it in Franklin's own words would have been more satisfactory.

An Introduction to the Study of Zoölogy. By B. LINDSAY, C. S., of Girton Coll., Cambridge. London, Swan, Sonnenschein & Co. New York, Macmillan & Co. 1895. Pp. xix+356, with 124 illustrations and diagrams. $1.60.

This little volume forms one of the series of 'Introductory Science Text-books,' and is designed, as the author states in the preface, to serve as 'a kind of guide book for readers who are about to begin the study of zoölogy.'

The plan of the book embraces a Glossary, General Principles of Zoölogy (Part I.), Systematic Zoölogy (Part II.), Advice to Students (Part III.), and an index of subjects and of names of genera.

Part I. treats of the distinction between animals and plants, the cell, origin of species, embryology, etc., much in the style of Claus and Sedgwick's 'Text-book of Zoölogy,' whose work apparently forms a basis for this. To the general reader this part will doubtless prove interesting, as it discusses in an attractive manner the biological principles involved in an intelligent study of the animal kingdom, and explains the meaning of many of the terms and phrases so often used but as often not understood. The criticism might, however, be made that the space (114 pages) given to this division of the subject is too large in proportion to that devoted to the systematic portion of the work (190 pages).

In Part II. we have a chapter discussing the principles of classification and, as examples of classification by type, brief descriptions of Amœba, Vorticella, Hydra and the earth-worm. Then follow nine chapters each devoted to one of the Phyla of the animal kingdom; a table of classification with examples of its use closes this part. The concluding part has chapters on 'The Use of Books' and 'Practical Work;' in these the student is referred to some of the standard zoölogical works, and useful hints are given to those who would learn to see and think for themselves.

The design of the book is certainly a good one. Many readers of popular works on animals and their habits, would be glad to learn something more of the relation that these animals bear to others, and of the zoölogical principles as understood at the present day. To

consult a zoölogy full of technical terms and anatomical figures is not usually attractive to the beginner. Given a book that is clear, concise and correct, but not too technical, such a reader would be led further in the same direction and, what is very important, would not have to unlearn.

The question naturally arises, does this book carry out the design? The author has in the main succeeded in writing a very readable book marked by a pleasant and interesting style; yet there are a few places where, through a faulty mode of expression, the meaning is rendered obscure, *e. g.* "Animals develop to a higher point, in which the body layers develop complicated organs, usually go through a larval stage very different in appearance from the adult" (p. 74). Other obscure sentences refer to the germ layers (p. 30), and the openings of the thoracic duct (p. 45).

In the compilation of a brief introductory text-book we can hardly expect to find the pages entirely free from errors; and, while in the main, the author presents a correct statement of our zoölogical knowledge, several errors have found their way into the book. For example, bone is said to be found in the cuttlefish (p. 43), though we find on p. 228 cartilage correctly given. The paranucleus of the Ciliata is confused with the nucleolus (p. 138). On p. 180 the Dendrocœla are stated on one line to be mostly fresh-water forms and a few lines further down to be mostly marine. A similar contradiction appears on p. 186, where we read 'The Entomostraca * * * are mostly fresh-water forms,' while, of the examples given, all are marine. On p. 198 there are two errors: the Chilognatha have 'two pairs of legs on each segment,' and of the thorax and abdomen of insects, it is stated that 'both have the segments completely fused.'

What seems a serious fault in the plan of the systematic part is the defining a group or Phylum by means of types, which are themselves not sufficiently described. Chapter IV. will illustrate this: The Echinoderms are defined as 'animals more or less resembling in structure the sea-urchin.' One who had never seen a sea-urchin would naturally expect to find a figure with which to compare the other forms of the Phylum; but there is none given, and the brief description would hardly serve his purpose. Had there been an anatomical figure and a more detailed description of each of the types selected, the book would be more useful to the ordinary reader.

The chapter on the Cœlenterata is perhaps the most unsatisfactory. The difficult group of the Cnidaria is best understood by treating the simpler Hydrozoa first and then the Scyphozoa; instead we have the arrangement as given by Claus and Sedgwick, and there is, as well, a lack of clearness and definite system. We think the book would have been improved by giving more attention to the Vertebrates. The description of the mammals is mostly confined to a discussion of the teeth, which subject, important as these organs are, is not likely to attract the reader or satisfy him in lieu of some other details which would naturally occur to him in comparing the various orders of mammals.

Notwithstanding the criticism of these, and certain other errors which should be corrected, we believe that the book will prove of value to the reader and, in the hands of a teacher who can amplify and explain, would serve as a good text-book where principles, rather than a detailed learning of systems and names, are desired.

The book is attractively and clearly printed. The text is quite free from typographical errors; we notice only 'infusoriæ' (p. 67), 'Arthropoids' (p. 186), 'fore' for four (p. 267). The numerous cross references are correctly given except that 'fig. 12' should be fig. 121 (p. 299). The 'List of Illustrations' shows, however, careless proof reading, for no less than nine of the figures are referred to the wrong page. In the contents there are two more errors, and we presume that of the original figures No. 133 should be No. 123. W. M. Rankin.

SCIENTIFIC JOURNALS.

THE AMERICAN GEOLOGIST, JANUARY.

Dr. C. E. Beecher presents a sketch of James Dwight Dana, in which attention is called to the varied faculties and broad scientific knowledge of the man, but no attempt is made to give a complete account of his life. Special

note is made of his ability to carefully weigh scientific evidence and of his unprejudiced position and final decision concerning the doctrine of evolution. A portrait and a bibliography accompany the sketch.

Mr. Warren Upham, in an article on 'Physical Conditions of the Flow of Glaciers,' describes the veined or ribboned structure and the granular structure of glaciers and ice sheets, with a review of the theories of Forbes and Tyndall to account for glacial motion. Preference is given to the recent granulation theory of Deeley and Fletcher; and the lamination of the Greenland and Antarctic ice sheets is attributed, like that of Alpine glaciers, to the differential shearing movement of the ice layers, with varying decrease, growth and shear of contiguous ice granules.

Some phenomena presented by floating sand are discussed by Prof. F. W. Simonds. He records an instance of the floating of a considerable amount of sand on the Llano River of Texas, and he also states the results obtained by artifically floating sand of various materials and degrees of fineness.

Mr. Oscar H. Hershey describes the ancient river deposits of the Spring River valley in Kansas and outlines the Quaternary history of this stream.

Prof. E. W. Claypole, in an article entitled 'The Timepiece of Geology,' rapidly sketches the rise of paleontology and the use of fossils in determining the age of strata. The application of this means of fixing the age of various rocks is rapid and easy, but the final test is stratigraphy.

In an editorial comment Mr. Upham notices the shell-bearing sand and clay beds between deposits of till at Clava, Scotland. The interglacial fossiliferous beds he thinks to be modified drift, like the similarly shell-bearing sand and gravel of Cape Cod. In neither case would he consider the enclosed marine fossils to be evidence of submergence, instead of which the shells and their fragments are referred to glacial erosion from old sea beds and transportation in the ice sheets to altitudes where they are now found.

Under 'Correspondence' Prof. W. B. Scott writes concerning the term 'Goodnight Beds,' proposed for a division of the Texas Tertiary by Mr. W. F. Cummins.

PSYCHE, JANUARY.

A. P. MORSE begins a review of the N. E. Tryxalinæ, giving tables for the determination of the 8 genera and 15 species; three of the genera are new. H. G. Dyar describes and discusses an arctic Lymantriid larva found on Mt. Washington, N. H., which he suspects is Dasychira rossii. C. H. Tyler Townsend gives a table for the determination of the 12 species of Exorista from temperate North America known to him, describing one of them as new; and F. H. Harvey gives some notes on Smerinthus cerysii with a description of some of the early stages.

SOCIETIES AND ACADEMIES.

ENTOMOLOGICAL SOCIETY OF WASHINGTON.

A SPECIAL meeting was held December 26th in the assembly hall of the Cosmos Club under the auspices of the joint commission of the scientific societies of Washington, on the occasion of the annual address of the retiring President, Mr. Wm. H. Ashmead. Major J. W. Powell, of the joint commission, presided. Mr. Ashmead's subject was 'The Phylogeny of the Hymenoptera,' which he treated at length, giving his ideas as to the position of the Hymenoptera in the class Insecta, and as to the relative position of the several families of the order.

The 113th regular meeting was held January 2d. The following officers were elected for the year 1896: President, C. L. Marlatt; Vice-Presidents, Theodore Gill and H. G. Hubbard; Recording Secretary, L. O. Howard; Corresponding Secretary, Frank Benton; Treasurer, E. A. Schwarz; Additional Members Executive Committee, W. H. Ashmead, D. W. Coquillett and C. W. Stiles.

Mr. Schwarz presented a paper on the semi-tropical insect fauna of Texas. He referred to the fact that he had made a short visit to the region in question in 1895, and said that the fauna west and south of the Guadaloupe River, and which extends across the Rio Grande into the Mexican States of Coahuila and Tamaulipas, is by no means semi-tropical in its character. It is simply a subdivision of the lower Sonoran

fauna. The real semi-tropical in Texas occupies an extremely small area, namely, the delta of the Rio Grande from the mouth of the river to the head of the Arroyo Colorado. The latter is an ancient bed of the Rio Grande, and forms the northern boundary of the semi-tropical fauna. Within this area the fauna in question occurs in narrow isolated strips, within the bends of the river, along the various resacas which intersect and meander through this region. The more elevated land separating these strips is occupied by the general fauna of southwestern Texas, but there is a maritime fauna of a more tropical character extending along the coast, probably as far north as Corpus Christi Bay. Finally the fauna of the yucca-covered ridges running parallel with the coast also belong to the semi-tropical region.

Dr. Gill said that Mr. Schwarz's observations on the extremely limited character of this fauna in Texas agree with his own deductions from the study of fishes. The paper was further discussed by Messrs. Ashmead and Howard.

Mr. Ashmead presented a paper on the genera of the Eupelminæ, showing that ten years ago only eight genera were tabulated by Cresson, and only one of these was known to occur in the United States. As a result of recent studies he has found in the United States representatives of 25 genera, several of which are new. He spoke briefly of some of the peculiar forms.

A paper by Mr. C. F. Baker on 'The Affinities of Neolarra,' was read by the Secretary. The writer concluded that this genus does not belong to the Bembecidæ, with which it had been placed by Ashmead, but to the Apidæ. The paper was discussed by Mr. Ashmead, who said that he agreed with Mr. Baker in his conclusions. The speaker in his original description of Neolarra had been led to place it with the Bembecidæ, largely from the fact that the type was in such poor condition that some of its important characters could not be well understood. He further said that he agreed with Haliday in considering the Bembecidæ as rather closely related to the bees on account of the structure of the mouthparts.

L. O. Howard,
Secretary.

PHILOSOPHICAL SOCIETY OF WASHINGTON.

At the last meeting of the Philosophical Society of Washington the following communications were presented:

1. By Lieutenant W. H. Beehler, United States Navy, on 'The compensation of vibrations and other motions of a vessel at sea for the constant level-base of the Solarometer.' Illustrated by diagrams and a solarometer instrument itself.

2. By E. D. Preston, on 'Some original methods of reducing stars from mean to apparent place.' Illustrated by diagrams showing how results are quickly obtained graphically.

Berard R. Green,
Secretary.

NEW BOOKS.

The Sun. C. A. Young. New and Revised Edition. New York, D. Appleton & Co. 1895. Pp. xii+363. $2.00.

Introduction to the Study of Fungi. M. C. Cooke. London, Adam and Charles Black. New York, Macmillan & Co. 1895. Pp. x+360.

Mechanics and Hydrostatics. R. T. Glazebrook. Cambridge, University Press. New York, Macmillan & Co. 1895. Pp. xiv+208+xxiv. $2.25.

Primer of the History of Mathematics. W. W. Rouse Ball. London and New York, Macmillan & Co. 1895. Pp. iv+158. 65 cts.

Plane and Solid Geometry. Wooster Woodruff Beman and David Eugene Smith. Boston and London, Ginn & Co. 1895. Pp. ix+320. $1.35.

The Theory of Social Forces: Simon N. Patton. Philadelphia, American Academy of Political and Social Science. 1896. Pp. 151.

Ethnology. A. H. Keane. Cambridge, University Press. New York, Macmillan & Co. 1896. Pp. xxx+442. $2.60.

Principles of Metallurgy. Arthur H. Hiorns. London and New York, Macmillan & Co. 1895. Pp. xiv+388.

The Chemists' Compendium. C. J. S. Thompson. London, Whittaker & Co. New York, Macmillan & Co. 1896. Pp. 230. $1.00.

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